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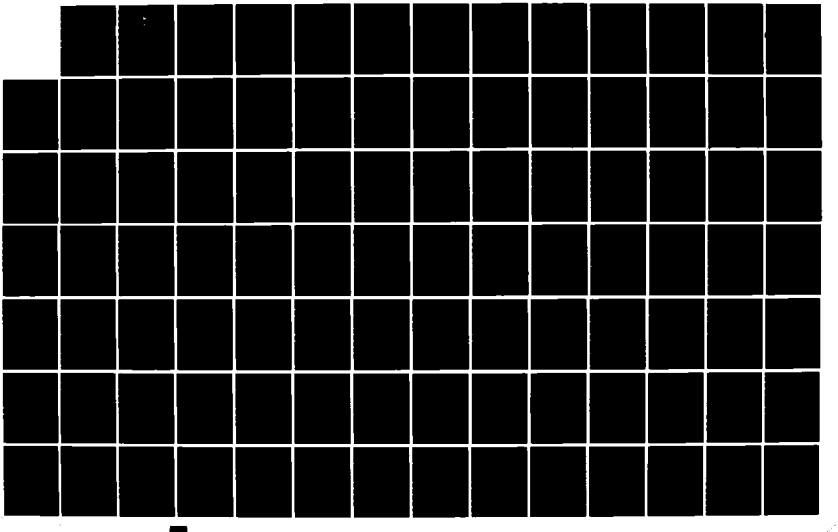

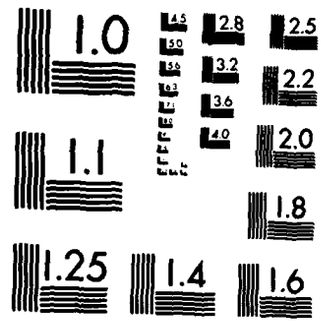

PROFILE OF A SUCCESSFUL CIVIL ENGINEERING CAREER IN THE UNITED STATES AIR FORCE

THESIS

James R. Cady
Captain, USAF

AFIT/GEM/LSM/84S-5

DEPARTMENT OF THE AIR FORCE
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Wright-Patterson Air Force Base, Ohio

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AFIT/GEM/LSM/84

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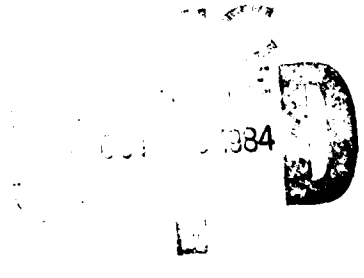

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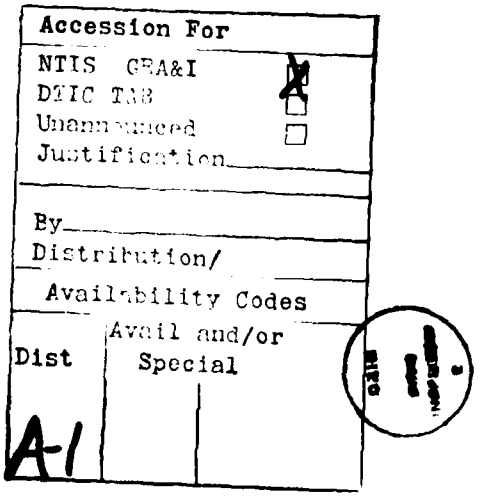

AFIT/GEM/LSM/84S-5

PROFILE OF
A SUCCESSFUL CIVIL ENGINEERING CAREER IN THE
UNITED STATES AIR FORCE

THESIS

Presented to the Faculty of the School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the the
Requirements for the Degree of
Master of Science in Engineering Management

James R. Cady, B.S.
Captain, USAF

September 1984

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James R. Cady

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Abstract

This research developed career profiles for successful and unsuccessful United States Air Force civil engineering officers. Also, this research identified those characteristics that best discriminated between the successful and the unsuccessful civil engineering officers.

Two populations of officer career briefs were selected for analysis. One population consisted of colonels, brigadier generals, and a major general; while the other population contained lieutenant colonels non-selected at least twice for promotion to colonel. Both populations contained officers serving in the civil engineering career field as of 18 February 1984. For the purpose of this study, success was defined as attaining the rank of colonel or above and currently serving in the civil engineering career field.

Selected variables from the Air Force Manpower and Personnel Center computer personnel records were analyzed to develop career profiles for the two populations and to determine the best discriminating variables. The results of the analysis were a set of profiles for the two populations

and a list of variables that best discriminated successful from unsuccessful careers. The variables that best predicted success were command experience, number of location changes, intermediate service school, highest award, AFESC tour, and senior service school. The results of this study can aid civil engineering officers and senior officers, concerned with career progression in the civil engineering career field, to develop career profiles that will aid success.

PROFILE OF A SUCCESSFUL CIVIL ENGINEERING CAREER IN THE UNITED STATES AIR FORCE

I. Introduction

Chapter one introduces the research on constructing career profiles of successful civil engineering officers. The following sections contain a discussion of the background and justification of the research, the problem statement, definition of terms, objectives, scope and limitations, and the research assumption.

Background and Justification

Effective organizations need career planning guides to help produce better qualified managers and to aid individuals in obtaining their career goals. Argyris indicated that an organization has to perform the three core activities of adaptation, goal attainment, and integration of individuals into their work roles in order to be effective and survive (Hall, 1976, 95). Also, Parsons adds the activity of pattern maintenance to the list (Hall, 1976, 95-96). Pattern maintenance regards integrating individual career goals with organizational goals. Integration of individuals into their work roles relates the need to

integrate the individual's career needs and attitudes with organizational goals. Both Argyris and Parsons relate the need of organizations to consider career development issues. The Air Force addresses the need for career development in AFR 36-23, Officer Career Development:

> Individual officer career development is essential to support the Air Force mission. . . . The primary purpose of career management is to ensure that qualified officers are available to take on responsibilities within the defense establishment. To do this, the Air Force must provide for the intellectual and professional growth of all officers, and encourage those who demonstrate potential to remain for a full military career. . . .[AFR 36-23, 1979, 1-1].

Although, the Air Force acknowledges the need for career planning, very little research has been conducted on career planning or career progression. The Defense Technical Information Center (DTIC) maintains only two research papers on career progression in the Air Force and both papers were Air Force Institute of Technology (AFIT) theses. Also, Sam Gould points out in his article on career planning, "The area is noticeably lacking in carefully designed research studies [Gould, 1979, 539]."

AFR 36-23, which acts as a suggested career planning guide, is not based on research (AFR 36-23, 1979). Therefore, the AFR 36-23 career progression guides need to be validated or changed. Also, research is needed to identify the career profiles of successful officers so that

young officers will have a guide to follow in his or her own career. These career profiles will help a junior officer plan a career that should enhance career progression and growth. Also through greater career satisfaction, the Air Force should obtain its goal of a more effective officer.

Statement of the Problem

An Air Force officer has AFR 36-23 to use as a guide to plan his or her career. However, AFR 36-23 provides only general and vague guidelines for Air Force civil engineering officers to follow. Also during my literature search, I found only two research papers testing AFR 36-23 to determine if its guidelines do ensure success and neither paper specifically addressed civil engineering career progression (Haynes, 1977; Beishke, 1977). Consequently, Air Force civil engineering officers do not have a validated and proven guide for developing realistic career progression plans that will ensure success of their career goals. Therefore, research was needed to develop career profiles for use by civil engineering officers.

Definition of Terms

The following terms, for the purpose of this study, were defined as:

> Career success refers to an Air Force civil engineering officer who has attained the rank of colonel or above. Due to the critical nature of this definition, the literature review devotes an entire section to a discussion of career success.
>
> An Air Force civil engineer is an officer currently possessing a 55XX duty Air Force Specialty Code (AFSC).

Statement of Objectives

The main objective of this study was to identify a characteristic career profile for successful civil engineering officers. The career profile contains a set of factors common to successful civil engineers. A secondary objective was to determine if the career profile of a successful civil engineering officer differs from the profile of an unsuccessful civil engineering officer. Also, the secondary objective sought to determine those factors that best discriminate between successful and unsuccessful civil engineering officers.

Scope and Limitations of the Study

This research project considered only those officers who attained the rank of colonel or above and those lieutenant colonels who were non-selected twice for promotion to colonel. Also, this study dealt with only those officers currently possessing a 55XX duty AFSC. The characteristics considered in this study were:

1. rank
2. age
3. military component
4. aeronautical rating
5. number of dependents
6. Air Force Institute of Technology (AFIT)
7. Squadron Officers School (SOS)
8. senior service school
9. command experience
10. overseas assignments
11. number of different MAJCOMs served in
12. CE experience
13. date of rank
14. birthplace
15. commissioning source
16. marital status
17. religion
18. education
19. intermediate service school
20. combat experience
21. staff experience
22. number of assignments
23. career MAJCOM
24. awards and decorations

These characteristics are discussed in chapter three and their significance to the study is explained.

Research Assumptions

This research project assumed that common factors or characteristics of successful Air Force civil engineers can be identified as significantly contributing to their career success. Also, there are factors that significantly distinguish successful officers from unsuccessful officers.

II. Literature Review

Chapter two acts as a starting point for researching the problem of profiling a successful Air Force civil engineer. In acting as a starting point, chapter two contains a literature review on career success and how other research studies have analyzed their data to ascertain their results. The first section presents a brief introduction and the second section deals with defining success in a career. The final section discusses different methods for profiling successful careers.

Introduction

Key terms have to be defined prior to conducting any research effort. The most important key term in this research effort was career success. Because of the difficulty of operationally defining success and because of the importance of the definition, this chapter devotes a whole section to the discussion of defining career success.

The civil engineer in the Air Force acts mainly as a manager of facilities and maintenance rather than a construction engineer. The civil engineering officer has similar career characteristics to civilian managers due to the managerial nature of Air Force civil engineering.

Therefore, literature about civilian managers applies to Air Force civil engineers too. Information on other Air Force officer careers also applies to civil engineering officers due to the fact that civil engineering and other career field officers are promoted under the same system.

An effective literature search requires specific guidelines to define the scope of the review. The major guideline was to limit the literature search to the period of 1973 to the present due to changes in the Air Force personnel and promotion system. Considering the factors presented in the previous paragraph, the literature review covers articles about both civilian manager career success and Air Force officer career success dated since 1973.

The definitions of career success and different methodologies for determining such success are provided in the following sections. The discussion of these topics present the major points found in the literature and discuss the civilian as well as the military points of view for each major point.

Career Success

Hall, in his book on careers in organizations, points out that many sources use different definitions of career

success (Hall, 1976, 93-95). Also, he indicates that there are four major measures of career success or effectiveness. The four measures are performance, adaptability, career attitudes, and sense of identity (Hall, 1976, 94). The most popular measure is performance which is discussed in the next paragraph. Adaptability concerns the measure of employee obsolescence or the ability of employees to update their knowledge and keep current with practices in their career field. Career attitudes concern the employee's values and his commitment to the organization. Career identity deals with the way the employee perceives and evaluates himself and his career. These latter three measures will be explained in more detail in a later paragraph.

Career success can be measured using several different performance criteria. Gould defined success as obtaining a higher salary (Gould, 1979). Another article used productivity to measure career success (Schaffer, 1981). However, within the area of performance, the most popular definition of career success is for an individual to be promoted to the top ranks or offices of an organization. Lotte Bailyn defined career success as, "The road to corporation president...[Bailyn, 1979, 18]." Bailyn's definition is similar to the majority of the definitions of career success. Most authors define the performance measure

of success in terms of reaching the top levels of management in an organization (Bartolome, 1980; Battista, 1976; Bolles, 1982; Conarroe, 1981; Gould, 1979).

The senior officer ranks (colonels and above) in the Air Force compare to top level management positions in civilian corporations. Therefore, career success in the Air Force could mean being promoted to the upper officer grades of colonel or above. Haynes and Herbert, in their AFIT thesis report, defined career success for a procurement officer as being promoted to the rank of colonel (Haynes, 1977, 5). Beishke and Lipsey, in their thesis, defined success as being promoted to the rank of brigadier general (Beishke, 1977). Reflecting Air Force policy, AFR 36-23 alludes to defining success as being promoted to the higher grades; additionally, the career planning guide outlines career progression to the top of each career field. Therefore, AFR 36-23 implies that officers who follow the guidelines for a career field will be successful and reach the top (AFR 36-23, 1979).

Hall relates that other definitions of career success exist, but they are not used as much as the previous performance measure definition (Hall, 1976, 94). Also, Air Force literature contains only the definition of success relating to the performance measure of promotion. Garfield used achievement or sense of accomplishment as a definition

of career success (Garfield, 1982). Garfield's use of achievement relates to Hall's use of identity because they both deal with the sense of accomplishment in a career. Hampton defined success as possessing certain characteristics like being energetic, creative, frustration tolerant, and motivated (Hampton, 1973). These characteristics relate to Hall's use of attitudes and adaptability in that a person's energy and motivation are measures of attitude. Also, creativity and frustration tolerance are measures of adaptability.

In conclusion, career performance appears to be the most accepted and used measure of career success. Within the area of performance, position or rank appears the prevalent measure of success. Therefore, most sources define career success as promotion to the top levels of management in an organization. Similarly, the Air Force considers success as promotion to the higher officer grades. Although other career success definitions exist, they are not as used as often.

Research Methods

The purpose of this section was to review the different research methods that have been used by other researchers to study career success. Hall identifies five basic types of

data for researching careers. He indicates the types of data can be used as background data, assessment data, personality data, career process data, and person-organization fit data (Hall, 1976, 97). Background data involves the use of biographical information that can be maintained in personnel records to determine success. Assessment data concerns the use of tests and evaluations to determine a person's capability to perform. Researchers use personality data, taken from personality tests, to determine success from certain personality traits like values, interests, and needs. Career process data is derived from recording a person's experiences on the job and how successful the person was in accomplishing those experiences. Finally, person-organization fit data refers to measuring how well a person's characteristics match the organization's characteristics.

Hall indicates that researchers use background data most often (Hall, 1976, 112-115). Due to the large use of background data and the availability of biographical information from the Air Force, this research used the background data approach to studying civil engineering careers. Therefore, the following discussion focuses on background data type research methods. The discussion of background data type research methods requires an outline of the characteristics or variables of a career and a listing

of the analytical techniques for analyzing those characteristics.

Background data contains many possible variables or characteristics to describe a career. Among those variables, AFR 36-23 applies three general characteristics in profiling an officer's career: professional military education (PME), continuing and furthering education, and assignments (AFR 36-23, 1979). Previous research projects on profiling career success have used several characteristics beyond those presented in AFR 36-23. Beishke and Lipsey analyzed military rank, place of birth, marital status, number of children, education, PME, source of commission, aeronautical rating, combat experience, assignments, and the time required to make the officer's current rank (Beishke, 1977, 21-25). Haynes and Herbert studied aeronautical rating, service component (regular or reserve), promotion zone, assignments, source of commission, PME, education, experience in the career field, marital status, number of children, religion, and the age of the individual (Haynes, 1977, 17). Beishke (1977) and Haynes (1977) both used the basic characteristics presented in AFR 36-23, but they also analyzed some additional characteristics to gain a better profile of success.

Once the characteristics are defined and the data collected, the researcher begins to analyze the data in

order to answer the research problem. Many statistical techniques exist for comparing and describing data for developing profiles. Humphrey summarizes three basic statistical steps:

> Analysis of the data involved a three-step process. The first step was to develop profiles for each achievement level through the use of means, standard deviations, relative frequencies, and correlation coefficients. The second step involved using a t-test, a chi-squared statistic, or an analysis of variance (one-way) to determine whether or not statistically significant differences existed between the achievement levels. The final step in the process was to perform a factor analysis and a discriminant analysis to identify which characteristics best predict success. . . .[Humphrey, 1983, 31].

Also, several researchers have applied these steps in their civilian profile studies (DeNisi, 1981; Veiga, 1981; Gould, 1979; Griffin, 1977). Therefore, the following paragraphs include a discussion of Humphrey's three statistical steps of population description, variable analysis for significance, and variable selection for the population profile.

First, the analysis uses basic statistical functions to describe the population. Humphrey used means, standard deviations, relative frequencies, and correlation coefficients to describe his population (Humphrey, 1983, 31-35). Other researchers have applied means and standard deviations to model or profile their data (DeNisi, 1981; Veiga, 1981; Gould, 1979; Griffin, 1977). Hence, the first

step basically describes the characteristics of the population being analyzed.

In the second major statistical step, the significant characteristics of the population are determined. Haynes and Herbert determined the percentage of a population possessing a certain characteristic. Then they compared two populations to see if there were any significant differences. Those characteristics that had significantly different percentages were used to profile success (Haynes, 1977, 20-22). Another technique uses the chi-squared statistic to determine significance. Both Humphrey and Beishke applied the chi-squared statistic to determine significance (Humphrey, 1983, 40-42; Beishke, 1977, 29-31). However, Humphrey went on to use a t-test and an analysis of variance (one-way) in his test of significance (Humphrey, 1983, 36-40).

Other researchers have used several different statistical techniques for determining significance of the population characteristics. DeNisi calculated significance by using multivariate analysis. The resulting F statistic was used to test for significance (DeNisi, 1981, 597). Also, Denisi applied a series of t-tests to compare variables (DeNisi, 1981, 600). Veiga also used an F statistic to determine significance (Veiga, 1981, 571). Gould, on the other hand, applied a stepwise multiple regression

statistical technique to determine significance (Gould, 1979, 547). Most profile studies apply some sort of statistics to determine the significant variables.

Humphrey's final statistical step ascertained the most significant characteristics in determining success. Humphrey's study of student success in a graduate engineering management program used factor analysis and discriminant analysis to identify those characteristics that best predicted success (Humphrey, 1983, 42-45). Other studies did not apply the third step.

The material in this chapter has acted as a starting point for the research of successful civil engineers in the Air Force.

III. Methodology

The third chapter presents an explanation of the research methodology. The discussion is divided into six sections: description of the universe and populations, data source, accuracy of data, biographical characteristics researched, analysis techniques, and assumptions and limitations.

Description of Universe and Populations

The universe is defined as all USAF officers currently serving in the civil engineering career field. The universe further consists of two populations based on rank. The first population contains those civil engineering colonels or higher currently serving on active duty in the regular Air Force. The second population contains those civil engineering lieutenant colonels who have been twice non-selected for promotion to colonel. The first population contains 133 officers including 129 colonels, 3 brigadier generals, and 1 major general. The second population contains 30 lieutenant colonels.

Data Source

Official computerized personnel records, maintained at the Air Force Military Personnel Center (AFMPC), Randolph AFB, Texas, provided the primary source of information about colonels and higher ranked officers. The Atlas data system produced the specific personnel information minus names and service numbers. Data for those lieutenant colonels twice non-selected for colonel was supplied through the same system with the assistance of the Air Force career monitor for the civil engineering career field at AFMPC.

Accuracy of Data

The computerized personnel records are the most accurate source of information about the people researched in this study. The data in the personnel records has been accumulated over a period of years for each officer. Most officers review, correct, and update their records periodically. Promotion boards use the computerized personnel records as their main source of information for determining whether an officer is to be promoted or not. Consequently, the computerized records act as a major determinant of career success in the Air Force and the data contained in the records can be assumed to be accurate. The

following section explains the list of characteristics or factors obtained from the computerized personnel career records.

Biographical Characteristics

Twenty-eight characteristics were considered to develop the profile of a successful civil engineer. These characteristics provide a wide spectrum of information about civil engineers. Also, these characteristics cover the attributes of career development discussed in AFR 36-23. Each of the characteristics considered in this research are discussed below along with an explanation of the criteria used and the reasons for including them in this analysis. Some of the following characteristics were considered, but not used due to their sensitivity and lack of availability. Those characteristics that were considered, but not used are also discussed below. The twenty-eight characteristics fall into five major categories. The five major categories are basic biographical information, education, professional military education (PME), military experience, assignments and awards:

Basic Biographical Information.

1. Current Military Rank: Rank acts as the indicator of success and was used to separate the two groups for analysis. The ranks of colonel, brigadier general, and major general composed the successful civil engineering officers and the rank of lieutenant colonel indicated the unsuccessful officers. Rank was determined as the current rank of the officer as of 18 February 1984.

2. Date of Rank: Initially date of rank was considered for inclusion in the analysis. However, it was later dropped from the research because the information was not included in the computerized records provided by AFMPC.

3. Age: Age was included in the analysis to determine if there was a significant difference in age between the two groups. Also, if the ages between the two groups were similar then historical bias would not interfere with the results due to both groups having been subjected to similar historical situations. Age was determined as of 18 February 1984.

4. Region of Birth: Different cultures have tended to settle in certain regions of the United States like the Scandinavians settling in the north central area of the country. Therefore, the study included birthplace due to

the cultural implications birthplace may play on success. The regions were derived from The Professional Soldier by Janowitz (Janowitz, 1971, 88).

5. Military Component: Initially, component was included to determine if a regular or reserve commission played a part in determining success. However, Defense Officer Personnel Management Act (DOPMA) recently changed the use of regular and reserve commissions. DOPMA caused all officers of the rank of major or above to automatically receive a regular commission. Therefore, the original intent of the military component variable was no longer valid.

6. Commissioning Source: Commissioning source was used to determine whether the service academies, reserve officer training corps (ROTC), officer candidate school (OCS/OTS), aviation cadets, or direct appointment had an effect on success. Also, commissioning as a distinguished graduate (DG) was included to see if DGs were more successful than nondistinguished graduates.

7. Aeronautical Rating: Aeronautical rating was included to determine if rated officers tend to be more successful. The possible ratings were pilot, senior pilot, command pilot, navigator, senior navigator, master navigator, other aeronautical rating, and non-rated.

8. Marital Status: Marital status was used to determine the impact of family on success. Also, marital status was included because Haynes and Beishke used marital status in their studies of career success (Haynes, 1977; Beishke, 1977).

9. Number of Dependents: Again, number of dependents was used to find the impact of family on success and was used by Haynes and Beishke (Haynes, 1977; Beishke, 1977). Total number of dependents was used due to the availability of the data. Therefore, the spouse, if there was one, was included in the number of dependents.

10. Religious Preference: This study used religious preference as an indicator of culture. Haynes and Beishke also used religious preference in their studies of success (Haynes, 1977; Beishke, 1977). The possible religious preferences were Roman Catholic, protestant, christian with no denominational preference, Jewish, Buddhist, any other religion not previously mentioned, and no religious preference.

Education.

11. Level of Education: Level of education was included to determine the effect of advanced education on promotion and success. AFR 36-23 uses advanced education in its discussion of career development. Therefore, level of

education determined the validity of advanced education being used in AFR 36-23. The possible education levels were high school, bachelor's degree, professional degree one (architectural equivalent of a bachelor's degree), bachelor's degree plus 30 hours, master's degree, professional degree two (architectural equivalent of a master's degree), master's degree plus 30 hours, and doctorate.

12. Air Force Institute of Technology (AFIT) Attendance: AFIT attendance was used to show whether attending an AFIT graduate school in residence had an impact on success.

13. Highest Education Level Degree Type: Degree type was entered into the analysis to see if a technical or non-technical degree influenced career success. All science and engineering degrees were coded in the technical degree category and all other degrees were coded as non-technical.

Professional Military Education.

14. Squadron Officer School (SOS): Completion of SOS and the other Professional Military Education (PME) schools indicate the amount of PME attained. AFR 36-23 points out the importance of PME to career progression, so these variables can validate that assumption. The possible responses were completion in residence, completion by

correspondence, no record of completion, and other.

15. Intermediate Service School: Intermediate Service School also indicates the amount of PME attained. The possible ways to complete intermediate service school were Air Force in residence, Air Force by seminar, Air Force by correspondence, Army in residence, Army by correspondence, Navy in residence, Navy by correspondence, Marines in residence, Marines by correspondence, Armed Forces in residence, or no record of completion.

16. Senior Service School: Again senior service school acted as a measure of PME attainment. The possible ways of completing senior service school were Air Force in residence, Air Force by seminar, Air Force by correspondence, Army in residence, Navy in residence, National War College in residence, Industrial College of the Armed Forces (ICAF) in residence, ICAF by correspondence, or no record of completion.

Military Experience.

Experience plays an important part in any kind of success and this study includes these various experiences to determine their effect on civil engineering career success in the Air Force. Also, AFR 36-23 discusses levels of experience and these variables will help to research that area.

17. Command Experience: Command experience addressed the issue of whether being a unit commander had an impact on success or not. All those cases with an A prefix to their AFSC sometime in their career were coded as having command experience and all others were coded as not having command experience.

18. Staff Experience: Staff experience was include to determine if the level of staff experience had an impact on success. The possible staff levels were wing, numbered air force, major command, Air Force Engineering and Services Center (AFESC), headquarters USAF, or none.

19. Civil Engineering Experience: The civil engineering experience variable indicated what impact experience in the civil engineering career field had on success. The cases were coded by the number of years the person held a 55XX AFSC.

Combat experience was considered, but dropped from the study due to the lack of information.

Assignments.

The characteristics below indicate experience, but they also indicate the mobility of a career. Literature relates that mobility is a definite factor in career success for managers (Hall, 1976). These variables will determine the

validity of that assumption for civil engineers officers.

20. Air Force Engineering and Services Center (AFESC) Tour: A tour at AFESC was included to determine if having an assignment to civil engineering's technical center had an impact on success.

21. Overseas Assignment: The overseas assignment variable was used to find out if having an overseas assignment impacted success. All cases that had an assignment outside the continental United States (CONUS) were coded as having an overseas assignment and all others as not having an overseas assignment.

22. Total Number of Assignments in the Last Ten Years: The number of assignment changes indicates mobility and how often a person changed his job. The total number of assignments included all permanent changes of station (PCS) and all permanent changes of assignment (PCA). Those lines on the assignment history in the personnel record were counted as a change in assignment only if the AFSC, job title, or duty location changed. The number of assignments and duty location changes considered only those changes in the past ten years because the computerized personnel records only included the necessary information since 1974.

23. Total Number of Duty Location Changes (PCS) in the Last Ten Years: The number of duty location changes was the

same as the number of assignment changes except the number of duty location changes only included PCS moves. Therefore, only those changes in duty location were counted as a change.

24. Number of Different Major Commands (MAJCOM) Served In: The number of different MAJCOMs served in is another measure of mobility and career broadening experience. The number of different MAJCOMs recorded in the assignment history was used to code this variable.

25. Career Major Command: Career MAJCOM reflected the MAJCOM that the person spent the most time in. This variable determined whether certain major commands have a higher promotion potential than other commands.

26. Percentage of Career Spent in Career MAJCOM: The percentage of a person's career spent in the career MAJCOM is another indicator of mobility. The percentage also shows how strongly a person has a career MAJCOM.

Awards and Decorations.

27. Number of Awards, Decorations, and Oakleaf Clusters: The total number of awards was analyzed to see if the number of awards played a part in promotion. All awards, decorations, and oakleafs recorded in the personnel records were counted.

28. Highest Award or Decoration: The highest award was included to determine if how high a person has an award impacts promotion. The possible awards (starting with the highest) were the Medal of Honor, Air Force Cross, Distinguished Service Medal, Silver Star, Legion of Merit, Distinguished Flying Cross, Bronze Star, Defense Meritorious Service Medal, Meritorious Service Medal, Air Medal, and Air Force Commendation Medal or lower.

Officer Efficiency Reports (OER): Most literature indicates performance appraisal as a major determinant in career success. In the Air Force, OERs act as performance appraisals of officers. The OER contains number ratings, written evaluations and suggestions, and endorsement levels as measures of performance. Therefore, this study needed to include OERs. However, due to the structure of the computerized personnel record system, OER information was unavailable for analysis. Also, OERs tend to fall in the category of assessment type data rather than the background type data used in this study. Therefore, the lack of OER information does not significantly limit this study, but could be the source of another research project.

Appendix A contains a complete list of variables and their possible responses.

Analysis Techniques

Like Humphrey's analysis presented in the previous chapter, this analysis involved three steps. The first step profiled successful and unsuccessful civil engineers using means, standard deviations, and relative frequencies. Secondly, a t-test and chi-squared analysis were used to determine which variables were significantly different between the successful and unsuccessful groups. Finally, a discriminant analysis was used to identify those characteristics that best predict career success. The subroutines contained in the Statistical Package for the Social Sciences (SPSS) version 8.3 performed the statistical analysis for this study (Nie, 1975).

The first step used frequency analysis to develop profiles for the two populations. The SPSS subprogram FREQUENCIES was used to obtain descriptive statistics for developing the profiles. FREQUENCIES provided a frequency distribution table, a number of descriptive statistics, and a histogram of the relative frequencies for each variable (Nie, 1975, 198). The means and relative frequencies taken from the frequency analysis were used to develop each population's profile. Also, the standard deviations, ranges, and histograms derived from this analysis were presented to show the consistency of the two populations.

The second step used a t-test and a chi-squared analysis to find those variables that showed a significant difference between the successful and unsuccessful civil engineering officers. Also, the second step determined which variables would be used in the discriminant analysis. Consequently, the second step helped to prevent variables from entering the discriminant function purely by chance. The t-test compares the means of the two populations and determines if there is a significant difference between the means (Nie, 1975, 269). The chi-squared statistic compares the frequencies for the two groups and determines if a relationship exists between the two groups (Nie, 1975, 223-224). The level of significance (alpha) used for both tests to determine if a variable was significant was 0.20 due to the preliminary nature of this study. Also, the 0.20 alpha was recommended by statistical experts, as indicated in the acknowledgements, in the School of Engineering and the School of Systems and Logistics at AFIT.

The analysis used a t-test on the continuous scale variables and a chi-square on the categorical variables. The continuous scale variables were those characteristics that could be considered interval type data. The categorical variables, on the other hand, were those characteristics whose values fell into categories or groups and could not be considered interval scale data. Therefore,

the t-test was performed on the variables of age, number of dependents, number of assignment changes, number of location changes, number of MAJCOMs served in, percent of career spent in career MAJCOM, CE experience, and number of awards. The chi-squared analysis was performed on the variables of birthplace, commissioning source, commissioned as DG, aeronautical rating, marital status, religion, education level, degree type, AFIT attendance, Squadron Officer School, intermediate service school, senior service school, command experience, staff experience, AFESC tour, overseas assignment, career MAJCOM, and highest award.

The SPSS subprogram T-TEST was used to perform the t-test analysis on the continuous scale variables. The T-TEST subprogram provides t-values and 2-tailed probabilities for both a population with equal (pooled) variances and one without equal (separate) variances. An F-test of the sample variances is also performed by the T-TEST subprogram to determine whether the variances are equal or not. If the probability for F is greater than the level of significance (alpha), then the variances are considered equal and the pooled variance estimate is used. Otherwise, the separate variance estimate must be used (Nie, 1975, 270). The appropriate 2-tailed probability then determined whether the variable was significantly different between the successfuls and the unsuccessfuls.

The SPSS subprogram CROSSTABS was used to perform the chi-squared analysis on the categorical variables. The CROSSTABS subprogram provides chi-squared values and significance for each comparison of frequencies. If the significance is less than alpha (0.20), then there is a significant difference between the successful and unsuccessful groups.

In the third and final step, those variables that were identified as significantly different in step two were analyzed to determine those variables that best distinguish successful officers from unsuccessful officers. Discriminant analysis was used to accomplish this objective. The objective of discriminant analysis is to weight and linearly combine discriminating variables in such a way that the groups are forced to be as statistically different as possible (Nie, 1975, 435). Discriminant analysis attempts to develop discriminant functions made up of those variables that best separate the groups. Discriminant analysis develops the discriminant function using a stepwise process much like the stepwise selection of variables used in multiple regression analysis (McNichols, 1980, 7-3). Once the discriminant function is developed, it can be used to classify or predict new cases into the different groups. In this project the discriminant function was used to predict success.

This analysis used the SPSS DISCRIMINANT subprogram with the Mahalanobis method to build the discriminant function. This SPSS subroutine seeks to maximize the Mahalanobis distance between the two groups (McNichols, 1980, 7-48). The Mahalanobis distance is a corrected measure of the euclidean distance between a point and a centroid or between two centroids (McNichols, 1980, 7-45). DISCRIMINANT provided a classification table which reports the percentage of the cases correctly classified. The table was useful in evaluating the effectiveness of the discriminant function to correctly classify cases (Nie, 1975, 445-446).

During the analysis, the DISCRIMINANT subprogram was run twice. The first run analyzed the total populations to obtain an overall effectiveness of the discriminant function. The second run randomly separated the two populations into two groups each. The DISCRIMINANT subprogram then used one of the two groups in each population to derive the discriminant function. Then SPSS tested the resultant discriminant function on the remaining unused groups in each population to determine the function's unbiased effectiveness.

From this analysis a profile was developed for successful civil engineering officers using means and frequencies. Also, a profile of the unsuccessful officers was developed. The two profiles were then compared and

contrasted using a t-test and chi- square analysis. The results of the t-test and chi-square analysis were then used to determine which variables were analyzed by the discriminant analysis. Consequently, the discriminant analysis presented those characteristics that best predicted success.

Assumptions and Limitations

The following assumptions were derived from chapter three:

1. The information obtained from the personnel records accurately portrays the careers researched.

2. The characteristics or variables considered in this research effort adequately reflect an officer's career progression.

The limitations of this study are:

1. Any determinants of successful careers identified in this study are limited to the populations selected for this study.

2. This study is limited to a specific time period for civil engineers only and cannot be generalized to other applications.

3. The use of Officer Efficiency Reports as a variable for measuring performance was unavailable due to the sensitive nature of the information contained in an OER.

IV. Analysis Results

Chapter four provides the results of the data analysis presented in chapter three. The chapter is divided into the three sections of career profiles, career profile differences, and career predictors. Appendix B contains the database used in the analysis to obtain the results explained in this chapter. A discussion of the results depicted in this chapter is provided in chapter five.

Career Profiles

As was mentioned in Chapter three, two different statistical techniques were used to develop career profiles. The first statistical technique used means, standard deviations, and range values. The second statistical technique used frequencies (the number of occurrences) and relative frequencies (percentage of occurrences to total population). Two profiles were developed with each statistical technique for profiling the successful civil engineering officers and the unsuccessful civil engineering officers.

Means and standard deviations for the continuous scale characteristics were used to create two career profiles. The two profiles are presented in Table I. The profiles include maximum and minimum values to provide information about the ranges of values contained in the two populations. The military component variable was dropped from the two profiles since all the members of both groups had regular commissions. The three variables of education level, staff experience, and highest award were included in the mean profiles even though they were not true continuous scale characteristics. However, the three characteristics do have some scalar qualities. The numbers in the two profiles for education level, staff experience, and highest award represent the levels of attainment for these variables. The numbers can be related to these variables by using Appendix A and setting the letter A to one, B to two, C to three, and so on.

The frequency profiles used the number of civil engineering officers and the relative frequencies for each categorical characteristic to develop two career profiles of successful and unsuccessful civil engineering officers. The categorical characteristics were those variables whose values fell into categories or groups and could not be rank ordered. The profiles include the frequency of cases possessing the characteristic and the relative frequency in

TABLE I

Career Profiles
Using Means, Standard Deviations, and Ranges

Variable		Mean	Standard Deviation	Range Maximum	Range Minimum
Age					
	Successful	47.805	3.118	55	38
	Unsuccessful	47.767	2.674	54	44
	t-test 2-tailed probability:		0.951		
Dependents					
	Successful	3.023	1.209	7	0
	Unsuccessful	2.933	1.172	5	0
	t-test 2-tailed probability:		0.714		
Assignment Changes					
	Successful	7.383	1.778	13	2
	Unsuccessful	6.600	1.653	11	4
	t-test 2-tailed probability:		0.029		
Location Changes					
	Successful	4.805	1.184	8	1
	Unsuccessful	4.067	1.048	6	2
	t-test 2-tailed probability:		0.002		
Number of MAJCOMs					
	Successful	5.293	1.375	9	1
	Unsuccessful	5.300	1.512	8	3
	t-test 2-tailed probability:		0.981		
Career MAJCOM Percent					
	Successful	37.707	17.464	88	11
	Unsuccessful	39.400	17.085	89	15
	t-test 2-tailed probability:		0.631		

NOTE: Successfuls are the colonels and above and the unsuccessfuls are lieutenant colonels twice non-selected for promotion to colonel. Also, all the t-test 2-tailed probabilities used the pooled estimates.

TABLE I (Continued)

Career Profiles
Using Means, Standard Deviations, and Ranges

Variable	Mean	Standard Deviation	Range Maximum	Range Minimum
CE Experience (Years)				
Successful	14.451	5.559	21	1
Unsuccessful	15.600	6.185	21	2
t-test 2-tailed probability:	0.318			
Number of Awards				
Successful	8.023	4.626	21	2
Unsuccessful	6.967	4.047	21	2
t-test 2-tailed probability:	0.250			

percent of population. The two profiles are presented in Table II.

A pictorial presentation of the frequency information is presented in Appendix C. Appendix C contains the histograms derived from the frequency information. An overall profile is provided in Table III and is based on Tables I and II. Table III compares the successful civil engineering officers with the unsuccessful civil engineering officers for each of the twenty-eight variables using the mean value or value with the highest frequency.

TABLE II

Career Profiles
Using Frequencies and Relative Frequencies

Variable	Number of Cases		Relative Frequency (percentage)	
	Suc.	Unsuc.	Suc.	Unsuc.
Rank				
Lieutenant Colonel		30		100.0
Colonel	129		97.0	
Brigadier General	3		2.3	
Major General	1		0.8	
Birthplace				
Outside the U.S.		3		10.0
Outside Conus	4	1	3.0	3.3
Pacific Coast	5	4	3.8	13.3
Mountain	3	1	2.3	3.3
West North Central	19	4	14.3	13.3
West South Central	14	2	10.5	6.7
East North Central	15	7	11.3	23.3
East South Central	12	1	9.0	3.3
South Atlantic	33	3	24.8	10.0
Middle Atlantic	20	4	15.0	13.3
New England	8		6.0	
Chi-squared significance:	0.0040			
Commissioning Source				
Air Force Academy	9		6.8	
Naval Academy	5		3.8	
Military Academy	5	1	3.8	3.3
ROTC	94	24	70.7	80.0
OTS/OCS	12	5	9.0	16.7
Aviation Cadets	8		6.0	
Chi-squared significance:	0.1185			
Commissioned DG				
Yes	27	5	20.3	16.7
No	106	25	79.7	83.3
Chi-squared significance:	0.6508			

TABLE II (Continued)

Career Profiles
Using Frequencies and Relative Frequencies

Variable	Number of Cases		Relative Frequency (percentage)	
	Suc.	Unsuc.	Suc.	Unsuc.
Aeronautical Rating				
Pilot	1		0.8	
Senior Pilot	2	1	1.5	3.3
Command Pilot	34	5	25.6	16.7
Navigator	2		1.5	
Senior Navigator	1	1	0.8	3.3
Master Navigator	17	1	12.8	3.3
Other Rating	1		0.8	
Non-Rated	75	22	56.4	73.3
Chi-squared significance:	0.2214			
Marital Status				
Married	129	27	97.0	90.0
Divorced	2	2	1.5	6.7
Widowed	1		0.8	
Single	1	1	0.8	3.3
Chi-squared significance:	0.2271			
Religion				
Roman Catholic	29	7	21.8	23.3
Protestant	100	21	75.2	70.0
Christian (No Denomination)	1		0.8	
Jewish	1		0.8	
Buddhist		2		6.7
No Religious Preference	2		1.5	
Chi-squared significance:	0.0786			

TABLE II (Continued)

Career Profiles
Using Frequencies and Relative Frequencies

Variable	Number of Cases		Relative Frequency (percentage)	
	Suc.	Unsuc.	Suc.	Unsuc.
Education Level				
Bachelor's	14	5	10.5	16.7
Professional Degree 1	2		1.5	
Bachelor's Plus	1		0.8	
Master's	103	24	77.4	80.0
Professional Degree 2	2	1	1.5	3.3
Master's Plus	1		0.8	
Doctorate	10		7.5	
Chi-squared significance:	0.6206			
Degree Type				
Technical	80	19	60.2	63.3
Non-Technical	53	11	39.8	36.7
Chi-squared significance:	0.7471			
AFIT Attendance				
Yes	9	2	6.8	6.7
No	124	28	93.2	93.3
Chi-squared significance:	0.9842			
Squadron Officer School				
Completed in Residence	55	11	41.4	36.7
Completed by Correspondence	45	11	33.8	36.7
No Record of Completion	31	8	23.3	26.7
Missing Data	2		1.5	
Chi-squared significance:	0.8599			
Intermediate Service School				
Air Force in Residence	31	4	23.3	13.3
Air Force by Seminar	22	11	16.5	36.7
Air Force by Correspondence	35	11	26.3	36.7
Armed Forces in Residence	12		9.0	
No Record of Completion	33	4	24.8	13.3
Chi-squared significance:	0.0608			

TABLE II (Continued)

Career Profiles
Using Frequencies and Relative Frequencies

Variable	Number of Cases		Relative Frequency (percentage)	
	Suc.	Unsuc.	Suc.	Unsuc.
Senior Service School				
Air Force in Residence	23		17.3	
Air Force by Seminar	16	8	12.0	26.7
Air Force by Correspondence	10	2	7.5	6.7
Army in Residence	2		1.5	
Navy in Residence	1		0.8	
National War College	2		1.5	
ICAF in Residence	21		15.8	
ICAF by Correspondence	38	10	28.6	33.3
No Record of Completion	20	10	15.0	33.3
Chi-squared significance:	0.0007			
Command Experience				
Yes	122	16	91.7	53.3
No	11	14	8.3	46.7
Chi-squared significance:	0.0000			
Staff Experience				
Wing	9	2	6.8	6.7
Numbered Air Force	4	3	3.0	10.0
MAJCOM	53	14	39.8	46.7
AFESC	13	2	9.8	6.7
Headquarters USAF	53	9	39.8	30.0
None	1		0.8	
Chi-squared significance:	0.5251			
AFESC Tour				
Yes	21	2	15.8	6.7
No	112	28	84.2	93.3
Chi-squared significance:	0.1948			

TABLE II (Continued)

Career Profiles
Using Frequencies and Relative Frequencies

Variable	Number of Cases		Relative Frequency (percentage)	
	Suc.	Unsuc.	Suc.	Unsuc.
Overseas Assignment				
Yes	126	29	94.7	96.7
No	7	1	5.3	3.3
Chi-squared significance:	0.6585			
Career MAJCOM				
MAC	14	2	10.5	6.7
TAC	20	2	15.0	6.7
SAC	32	6	24.1	20.0
AFLC	2		1.5	
PACAF	9	3	6.8	10.0
USAFE	20	6	15.0	20.0
AFSC	9	4	6.8	13.3
ATC	10	6	7.5	20.0
Other	17	1	12.8	3.3
Chi-squared significance:	0.2527			
Highest Award				
Silver Star	1		0.8	
Legion of Merit	31		23.3	
Distinguished Flying Cross	24	5	18.0	16.7
Bronze Star	46	12	34.6	40.0
Defense MSM	1	2	0.8	6.7
MSM	28	11	21.1	36.7
Missing Data	2		1.5	
Chi-squared significance:	0.0199			

TABLE III

Successful vs Unsuccessful Career Profiles

Variable	Successful Profile	Unsuccessful Profile
Age	47.805	47.767
Birthplace	East Coast	Central
Component	Regular	Regular
Commissioning Source	ROTC	ROTC
Commissioned DG	No	No
Aeronautical Rating	Non-rated	Non-rated
Marital Status	Married	Married
Number of Dependents	3.023	2.933
Religion	Protestant	Protestant
Education Level	Master's	Master's
AFIT in Residence	No	No
Degree (highest educ. level)	Technical	Technical
Squadron Officer School	Correspondence	Correspondence
Intermediate Service School	Air Force	Air Force
Senior Service School	ICAF	ICAF
Command Experience	Yes	No
Staff Experience	MAJCOM	MAJCOM
AFESC Tour	No	No
Overseas Assignment	Yes	Yes

TABLE III (Continued)

Successful vs Unsuccessful Career Profiles

Variable	Successful Profile	Unsuccessful Profile
Assignment Changes	7.383	6.600
Location Changes	4.805	4.067
Different MAJCOMs	5.293	5.300
Career MAJCOM	SAC	SAC/ATC/USAFE
Career MAJCOM Percent	37.707	39.400
CE Experience	14.451	15.600
Number of Awards	8.023	6.967
Highest Award	Bronze Star	Defense MSM

Career Profile Differences

A t-test and a chi-squared analysis were used to determine which variables were significantly different between the successful and unsuccessful civil engineering officers. The t-test results are presented in Table I for the continuous scale variables. All of the t-test 2-tailed probabilities used the pooled estimates due to the F probabilities for the variables ranging from 0.338 to 0.930 which was well above the significance level. The

chi-squared results are presented in Table II for the categorical variables. For a significance level of 0.20, the significantly different variables were birthplace, senior service school, command experience, assignment changes, location changes, highest award, religion, intermediate service school, commissioning source, and AFESC tour.

Career Predictors

Discriminant analysis was used to determine which career characteristics would best predict success for civil engineering officers. Also, discriminant analysis determined which factors were most important in discriminating between the successful and unsuccessful civil engineering officers. The variables found in the t-test and chi-squared analysis to be significantly different were the variables analyzed by the discriminant function. The variables analyzed by the discriminant function were birthplace, intermediate service school, senior service school, command experience, assignment changes, location changes, highest award, commissioning source, and an AFESC tour.

The discriminant analysis function included 8 variables and had a classification rate of 81.60 percent correctly

classified. The eight variables were command experience, number of location changes, birthplace, highest award, intermediate service school, AFESC tour, senior service school, number of assignments. Table IV lists the variables with their coefficients and the step the variable entered the model. The discriminant function multiplies the coefficients with the corresponding variable values and sums the resultants of the multiplication to determine which group a case falls into. The step the variable entered the discriminant function indicates the variables significance in discriminating between the groups analyzed. The variable that entered in step one has the greatest discriminating capability, the variable in step two has the next greatest capability, and so on through the last step. Table V shows the classification table. The classification table presents how the discriminant function placed the cases into the two groups.

Several discriminant analyses were run to see if excluding any of the variables improved the classification rate of the resulting discriminant function. The resulting classification rates ranged from 77.30 to 85.89 percent. The highest prediction rate was derived by excluding the birthplace variable from the analysis. The resulting discriminant analysis function included 6 variables and correctly classified 85.89 percent of the cases.

TABLE IV

Standardized Discriminant Function Coefficients

Step	Variable	Discriminant Function Coefficients
1	Command Experience	-.71016
2	Location Changes	.33457
3	Birthplace	-.45591
4	Highest Award	.23203
5	Intermediate Service School	-.29955
6	AFESC Tour	.29177
7	Senior Service School	.26032
8	Number of Assignments	-.17923

TABLE V

Discriminant Analysis Classification

Actual Group	Number of Cases	Predicted Group Membership Unsuccessful	Successful
Unsuccessful	30	21 70.0%	9 30.0%
Successful	133	21 15.8%	112 84.2%

Percent of Grouped Cases Correctly Classified - 81.60%

The function contained the variables of command experience, number of location changes, intermediate service school, highest award, AFESC tour, and senior service school. Table VI presents the variables, their coefficients, and the step the variable entered the function. Table VII gives the classification table. Besides excluding the birthplace variable, several other discriminant analyses were run to see if excluding just one of the other variables (the variables that entered the function) had a similar effect as birthplace by increasing the classification rate. None of these analyses had a higher classification than 85 percent. Therefore, the best discriminant function was the function presented in Table VI.

A final discriminant analysis was performed to validate the previous findings using a special function of SPSS that randomly divides the two populations in half. The discriminant analysis then built a discriminant function using one of the divided halves for each population. Once the discriminant function was derived, the analysis tested the function on the other unused halves to determine the classification rate on a random sample. The analysis had a classification rate of 87.84 percent on the halves used to develop the function and 80.90 percent for the unused halves. Table VIII presents the classification tables for the two halves.

TABLE VI

Standardized Discriminant Function Coefficients
Using All Variables Except Birthplace

Step	Variable	Discriminant Function Coefficients
1	Command Experience	.77763
2	Location Changes	-.44202
3	Intermediate Service School	-.31612
4	Highest Award	.25490
5	AFESC Tour	.31915
6	Senior Service School	.24220

TABLE VII

Discriminant Analysis Classification
Using All Variables Except Birthplace

Actual Group	Number of Cases	Predicted Group Membership Unsuccessful	Successful
Unsuccessful	30	21 70.0%	9 30.0%
Successful	133	14 10.5%	119 89.5%

Percent of Grouped Cases Correctly Classified - 85.89%

TABLE VIII

Discriminant Analysis Classification
Using Random Selection of Cases

Analyzed Group Classification

Actual Group	Number of Cases	Predicted Group Membership Unsuccessful	Successful
Unsuccessful	18	12 66.7%	6 33.3%
Successful	56	3 5.4%	53 94.6%

Percent of Grouped Cases Correctly Classified - 87.84%

Unanalyzed Group Classification

Actual Group	Number of Cases	Predicted Group Membership Unsuccessful	Successful
Unsuccessful	12	6 50.0%	6 50.0%
Successful	77	11 14.3%	66 85.7%

Percent of Grouped Cases Correctly Classified - 80.90%

V. Discussion of Results

Chapter five provides a discussion of the results presented in chapter four. The discussion contains three sections. The first section contains a discussion of the profiles exhibited in chapter four. The second section presents a discussion of the significant career profile differences. The third section concerns the discriminant analysis results.

Career Profiles

The profiles developed from the frequency analysis were quite similar in nature between the two groups of successful and unsuccessful civil engineering officers. Most of the differences between the two groups were small and subtle. The discussion on the career profile results is broken into the areas of basic biographical information, education, professional military education, military experience, assignments, and awards.

Basic Biographical Information. Both groups had an average age of 47.8 which tends to validate the assumption made earlier about the two groups having the same age to prevent historical biases. Both groups had birthplaces spread across the United States. However, the successfuls

had a large percentage born along the East Coast as compared to the unsuccessfuls that had a large percentage born in the Central area of the United States. Also, the unsuccessful group's birthplaces were rather evenly spread across the country and the successful group had a relatively small number of cases born in the western part of the country.

All of the members in both populations were regular officers. DOPMA caused the question about military component to be useless due to all officers promoted to major and above were automatically made regular officers under DOPMA. The vast majority of both groups were commissioned through ROTC. The successfuls, however, tended to have more academy officers, whereas, the unsuccessfuls had relatively more OTS commissions. Neither group had a significant number of Distinguished Graduates (DG) at commissioning. The majority of both groups were non-rated, but the successfuls had a higher percentage of rated officers.

Both groups had a high majority of married officers, but the unsuccessfuls had a slightly lower percentage of married officers. Both groups had roughly three dependents. Therefore, on the average they had a wife and two children. Both groups tended to have a religious preference toward the protestant faith. Both groups were fairly equal in the percentages of protestants and

catholics.

Education. Both groups had an average education level of a master's degree and the majority of both groups had master's. However, the unsuccessfuls tended to have a lower education level compared to the successfuls. The lower education level for unsuccessfuls was caused by the unsuccessfuls having relatively no degrees higher than a master's and the successfuls having a relatively larger percentage of degrees higher than master's. Both groups had almost identical percentages of technical and non-technical degrees. Also, neither group had a significant number of people attend AFIT in residence.

Professional Military Education. The next three questions dealt with professional military education (PME). The majority of both groups completed Squadron Officer School by correspondence, but the successfuls had a higher percentage of officers attend SOS in residence. Both groups tended to complete intermediate service school through Air Command and Staff College (ACSC). The successfuls, however, had a higher percentage of members taking intermediate service school from a different service. Both groups tended to complete senior service school, but the successfuls had more people attend in residence. Overall, both groups had high percentages of completion in PME courses.

Military Experience. The next questions tried to address the issues of experience. The successfuls tended to have command experience, whereas, the unsuccessfuls did not have much command experience. The lack of command experience among unsuccessful may have been due to most command positions in civil engineering being Colonel slots. Both groups had an average staff level experience at the MAJCOM level. The successfuls, however, had a higher percentage of cases having U.S. Air Force headquarters experience. The successfuls had slightly less civil engineering experience with 14.4 years and the unsuccessful had 15.6 years of experience.

Assignments. Neither group tended to have an Air Force Engineering and Services Center (AFESC) tour. The successfuls, however, had a higher percentage of people having had an AFESC tour. Both groups had a large majority of people having at least one overseas assignment. The successfuls tended to change duty location more often than the unsuccessfuls. The successfuls changed duty location on the average of five times in the last ten years. The unsuccessfuls changed location on the average of four times. Both groups had an average of five different MAJCOMs that they have served in. The information on a career MAJCOM was not conclusive, but more of the successfuls spent a majority of their careers in SAC and the unsuccessfuls

were split between SAC, ATC, and USAFE. The successfuls spent 37.7 % of their careers in their career MAJCOM and the unsuccessfuls spent 39.4 % of their careers. Overall, the unsuccessfuls appear to be less mobile than the successfuls.

Awards. The successfuls had an average of eight awards as compared to the unsuccessfuls who had an average of seven awards. The higher average number of awards by the successfuls was partly due to the higher percentage of rated officers in the successful group. The cases that had high numbers of awards were usually rated officers with a large number of air medals. Also, the higher number of awards could be related with the higher number of duty assignment changes that the successful group had. The successfuls tended to have their highest award one medal higher than the unsuccessfuls. The successfuls had an average of a Bronze Star and the unsuccessfuls had an average around a Defense Meritorious Service Medal.

Significant Career Profile Differences

The second part of the analysis used a t-test and a chi-squared statistic. The t-test and chi-squared statistic compared the variables between the two groups and determined if the variables were significantly different between the

two groups. The variables of birthplace, senior service school, command experience, assignment changes, location changes, religion, intermediate service school, commissioning source, AFESC tour, and highest award were found to be significant at the 0.20 significance level. Again, the 0.20 significance level was selected due to the exploratory nature of this study and the recommendations of statistical experts at AFIT.

The t-test pointed out that assignment changes and location changes were significantly different between the successful and unsuccessful civil engineering officers at the 0.20 significance level. Assignment changes and location changes were significant because the successfuls moved more often on the average than the unsuccessfuls. The chi-squared analysis determined that birthplace, commissioning source, religion, intermediate service school, senior service school, command experience, highest award, and an AFESC tour were significantly different between the two groups at the 0.20 significance level. Birthplace was significant due to the successfuls having been born more in the eastern regions and the unsuccessfuls having been born more in the mid-western to western regions. Commissioning source became significant because the successfuls had a higher percentage of academy graduates and a lesser percentage of OTS/OCS graduates than the unsuccessfuls. The

fact that the successfuls had a higher percentage of Roman Catholics caused religion to be significant.

Intermediate service school was significant due to the successfuls having a higher percentage of people completing intermediate service school from a school outside of the Air Force like the Armed Forces school. The fact that the successfuls had a higher percentage of officers attending senior service school in residence and that the unsuccessfuls had a higher percentage of officers with no record of completion caused senior service school to be significant. Command experience was significant because the successfuls had a higher percentage of officers with at least one command assignment. The successfuls had higher percentages in the higher awards than the unsuccessfuls and this caused highest award to become significant. Finally, the fact that the successful civil engineering officers had a higher percentage of officers with an AFESC tour caused an AFESC tour to be significant. The histograms (Appendix C) give a graphical explanation for the chi-squared results.

Discriminant Analysis Results

The third part of the analysis involved the use of discriminant analysis. Discriminant analysis presented the variables that best discriminate between the successful

group and the unsuccessful group. Again, discriminant analysis is a stepwise process and the variables are listed starting with the best discriminator and continuing to the least discriminator. The discriminators were, in order of significance, command experience, PCS moves, intermediate service school, highest award attained, Air Force Engineering and Services Center tour, and senior service school. These discriminators were able to correctly predict a person's success 85.89 percent of the time.

Several conclusions can be formulated from the research results. Command experience was the biggest discriminator and tends to give the impression that command experience is a must for career success. Command experience has importance to career success and especially when an officer reaches the upper rank structure. On the other hand, command experience may not be perceived as the cause of success, but as a result due to the perceived notion that the majority of command assignments in the civil engineering career field are colonel assignments. However, the 1984 Officer Authorization Listing (OAL) presented a slight majority of command assignment authorizations for lieutenant colonels and below compared to colonel command assignment authorizations (OAL, 1984). The OAL listed 60 colonel command assignments, 58 lieutenant colonel command assignments, and 7 major command assignments (OAL, 1984).

Also, it is possible for a lieutenant colonel to fill a colonel command assignment authorization. Consequently, CE lieutenant colonels have an opportunity to hold command assignments and the results indicate that such an assignment leads to career success.

The significance of the number of duty location changes (PCS) tends to confirm the hypothesis that mobility is an ingredient to success. PME did not prove to be as important as believed. Intermediate service school came in as a discriminator not due to completion, but due to the successfuls having a larger number of people taking the school from another service. Also, senior service school entered the discriminant function not due to completion, but because the successfuls had higher percentages of people attending senior service schools in residence. The fact that the successfuls had a higher rate of people attending senior service school in residence may be due to the successfuls having been recognized for their accomplishments by being selected to attend in residence. Most discussions on promotion boards tend to indicate that awards do not play a significant role in promotion, however, the results of the analysis indicate that having a higher medal is important. Finally, the results indicated that having an AFESC tour was an aid to success.

Birthplace was a high discriminator that was not mentioned above. In the early stages of the analysis birthplace came out as a discriminator. Essentially, birthplace is a random occurrence. The analysis was run again while omitting birthplace as a variable and found that the prediction rate increased. This result tends to confirm that birthplace is a random occurrence and that the two groups tended to be born in different parts of the country by coincidence. Another problem with this study was the small size of the unsuccessful population. In conclusion, the study did obtain some valid results even with the small population size of the unsuccessfuls.

Finally, the results of the discriminant analysis that used a random selection of cases (Table VIII) indicated that the results of the discriminant analysis were not biased. The 80.9 percent prediction rate for the randomly chosen group validated the results of the other discriminant analyses by showing that the prediction rate for a random sample was similar to the prediction rate of the other discriminant analyses where a random sample was not used.

VI. Conclusions and Recommendations

Chapter six contains the conclusions that can be drawn from the results of the research and makes recommendations for further research. The first section presents the conclusions to the research objectives. The second section recommends future research and concludes the chapter. The third section contains a brief summary of this research project.

Conclusions

The main objective of this study was to identify a career profile for successful civil engineering officers. The successful civil engineering officer was about 48 years old and was born on the east coast of the United States. Also, the successful officer was a regular officer commissioned through ROTC or a service academy and was not commissioned as a distinguished graduate. The successful civil engineer was non-rated, married, and has two children. He tended to be a protestant.

Educationally, the civil engineering officer has worked on advanced degrees and has received a master's degree or higher. His advanced degree probably was in a technical area, but if his degree was not a technical degree it

probably was connected with some sort of management degree. Also, the successful civil engineering officer probably did not attend the Air Force Institute of Technology (AFIT) in residence to receive his advanced degree. The successful officer probably did not attend AFIT in residence due to the fact that AFIT was not offering resident graduate education to civil engineering officers prior to 1972. The successful officer has completed all three levels of professional military education. He probably took Squadron Officer School by correspondence and took Air Command and Staff College by seminar, correspondence, or in residence. The successful civil engineering officer probably took senior service school through the Industrial College of the Armed Forces by correspondence or in residence as opposed to Air War College.

The successful civil engineering officer has had some sort of command experience. Also, the successful officer has served on a major command staff or higher during his career. However, the successful officer has had less experience in civil engineering with about fourteen years of experience. This also indicated that the successful officer has had more career broadening or a broader experience of career fields in the Air Force.

The successful civil engineer probably did not have an Air Force Engineering and Services Center tour, but if a person did have an AFESC tour it aided his career due to the higher percentage of successful officers having had an AFESC tour. Also, this was confirmed by the chi-squared significance test. The successful officer tended to change duty location once every other year and has had at least one overseas assignment. Also, the successful officer has spent only about a third of his career in any one major command. Overall, the successful civil engineering officer was more mobile during his career and did not settle in one place too long. The successful officer has approximately eight awards and his highest award probably was a Bronze Star.

The secondary objective of this study was to determine if the career profile of a successful civil engineering officer differed from the profile of an unsuccessful civil engineering officer. Also, the secondary objective sought to determine those characteristics that best discriminated between successful and unsuccessful civil engineering officers.

The career profiles developed for the main objective were similar for most of the variables between successful and unsuccessful civil engineering officers. However, there were significant differences pointed out in some of the

variables by the t-test and chi-squared analysis. Also, there was a significant difference between the two groups because the discriminant function was able to correctly discriminate between the groups 85.89 percent of the time. The t-test and chi-squared analysis determined that birthplace, commissioning source, religion, intermediate service school, senior service school, command experience, AFESC tour, assignment changes, location changes, and highest award were significantly different between the two groups at the 0.20 significance level. The discriminant analysis formulated six variables that were the key characteristics in differentiating between successful and unsuccessful officers. The six variables were command experience, location changes, intermediate service school, highest award, AFESC tour, and senior service school. These six variables were the key characteristics in determining career success.

The discriminant analysis pointed out that the six variables, mentioned above, were the key predictors of career success. The most important key to success was command experience. Command experience, as a predictor, represented about three fourths of the discriminant functions ability to correctly differentiate between the successfuls and unsuccessfuls. Again, command experience as a good discriminator could have been due to the fact that

some of the civil engineering command assignments are colonel positions. However, the fact that the majority of civil engineering command positions are lieutenant colonel and major assignments, tends to lessen the impact of colonel command positions on the validity of command experience as a discriminator. The fact that colonel civil engineering command positions can be filled by lieutenant colonels and the fact that there are command assignments outside the civil engineering career field also tend to lesson the impact of colonel command positions on the validity of command experience as a discriminator. In conclusion, command experience was important to career success. However, further research is needed to determine just how important command experience is to career success.

Mobility was the next most important characteristic in determining career success. Mobility was important to success because of the number of location changes being in the discriminant function. The results point out that a civil engineering officer should not stay in one location for too long and should be flexible to move where he or she is needed. Professional military education was important to success, but the reason intermediate service school entered the discriminant function was due to the successfuls having more cases of completions from schools outside of the Air Force like the Armed Forces College. Also, senior service

school entered the discriminant function because the successfuls had a higher percentage of officers that attended in residence. Both the successful and unsuccessful civil engineering officers had a high completion rate for all three PME schools. The fact that both groups had high completion rates may indicate that PME was important for promotion to the rank of lieutenant colonel or below. Therefore, PME may have more importance for promotion to lieutenant colonel and below.

Achievement was important to success because of the higher awards achieved by the successful civil engineering officers. Also, the fact that the successfuls had a higher percentage of people attend senior service school in residence tended to indicate that the successfuls were recognized for their achievement and chosen to attend in residence. There was a small number of officers that had an AFESC tour, but those that did were aided by the AFESC tour since the AFESC tour variable entered the discriminant function. The AFESC variable may indicate the importance of staff experience on career success. Performance would have undoubtedly been a key to success, but the lack of OER information for analysis prevented an investigation of this area. Also, this research concentrated on using background type data and OERs are more of an assessment type data and outside the scope of this study.

Recommendations for Future Research

The following is a list of recommendations for future research:

1. If this study proves to be of value to the Air Force Manpower and Personnel Center (AFMPC) and other Air Force agencies, then similar studies should be conducted on other career fields. The study of other career fields could aid those career fields in developing career progression patterns.

2. A further study of civil engineering officers should be conducted to determine:

(a) Why the command experience characteristic was so high a discriminator between success and non-success.

(b) The impact of mobility on career success in the Air Force.

(c) Why the successful civil engineering officers had less civil engineering experience than the unsuccessful civil engineering officers.

(d) The impact of PME on the promotion to ranks below colonel.

(e) How the timing of different career characteristics like staff assignments impact career success.

3. Officer efficiency reports (OER) supposedly play a large part in the promotion system and career success. Therefore, a future study should attempt to obtain OERs and research the impact of OERs on the promotion system and

career success. The study should attempt to use the rating scales, endorsing officials, and some measure of the writing style used to determine the impact of OERs.

4. Studies could be done using the other types of data mentioned in Hall's book besides background or biographical data for measuring career success (Hall, 1976, 93). The studies could use assessment data, personality characteristics, career process, or person-job fit information to determine career success.

Summary

This research project provided initial career profiles for successful and unsuccessful Air Force civil engineering officers. Also, six career characteristics were found to discriminate between success and non-success. The six characteristics emphasized the importance of command experience, career mobility, PME (senior and intermediate service school), achievement, and an AFESC tour. The career profiles and discriminating characteristics provide AFMPC and the senior Air Force civil engineering leadership with career information on civil engineering officers. Consequently, actions can be taken to improve career progression opportunities for civil engineering officers in the Air Force.

Appendix A: Data Collection List

1. Current Military Rank

   A. Lieutenant Colonel
   B. Colonel
   C. Brigadier General
   D. Major General
   E. Lieutenant General or higher

2. Age

   A. 37 or younger
   B. 38
   C. 39
   D. 40
   E. 41
   F. 42
   G. 43
   H. 44
   I. 45
   J. 46
   K. 47
   L. 48
   M. 49
   N. 50
   O. 51
   P. 52
   Q. 53
   R. 54
   S. 55
   T. 56 or older

3. Region of Birth

   A. Outside the United States
   B. Outside CONUS (Hawaii & Alaska)
   C. Pacific (California, Oregon, & Washington)
   D. Mountain (New Mexico, Arizona, Colorado, Utah, Nevada, Idaho, Wyoming, & Montana)
   E. West North Central (N. Dakota, S. Dakota, Minnesota, Iowa, Nebraska, Kansas, & Missouri)
   F. West South Central (Oklahoma, Arkansas, Texas, & Louisiana)
   G. East North Central (Illinois, Indiana, Ohio, Michigan, & Wisconsin)
   H. East South Central (Mississippi, Alabama, Tennessee, & Kentucky)
   I. South Atlantic (Florida, Georgia, S. Carolina, N. Carolina, Virginia, W. Virginia, Maryland, Delaware, & Washington, D.C.)
   J. Middle Atlantic (Pennsylvania, New York, & New Jersey)
   K. New England (Maine, Vermont, New Hampshire, Massachusetts, Connecticut, & Rhode Island)

4. Military Component

A. Regular
B. Reserve
C. Air National Guard

5. Commissioning Source

A. U.S. Air Force Academy
B. U.S. Naval Academy (Annapolis)
C. U.S. Military Academy (West Point)
D. ROTC
E. OTS/OCS
F. Aviation Cadet
G. Direct Appointment

6. Commissioned as a Distinguished Graduate

A. Yes
B. No

7. Aeronautical Rating

A. Pilot
B. Senior Pilot
C. Command Pilot
D. Navigator
E. Senior Navigator
F. Master Navigator
G. Other Aeronautical Rating
H. Non-rated

8. Marital Status

A. Married
B. Divorced
C. Widowed
D. Single

9. Total Number of Dependents

A. None
B. One
C. Two
D. Three
E. Four
F. Five
G. Six
H. Seven
I. Eight
J. Nine
K. Ten or more

10. Religion

A. Roman Catholic
B. Protestant
C. Christian (Non Denominational)
D. Jewish
E. Buddhist
F. Other
G. No Religious Preference

11. Highest Level of Education

A. High School
B. Bachelor's Degree
C. Professional Degree One
D. Bachelor's Degree plus 30 hours
E. Master's Degree
F. Professional Degree Two
G. Master's Degree plus 30 hours
H. Ph.D.

12. Highest Level of Education Degree Type

A. Technical
B. Non-Technical

13. Attended AFIT in Residence

A. Yes
B. No

14. Squadron Officer School (SOS)

A. In Residence
B. Correspondence
C. No Record of Completion
D. Other

15. Intermediate Service School

A. Air Force in Residence
B. Air Force by Seminar
C. Air Force by Correspondence
D. Army in Residence
E. Army by Correspondence
F. Navy in Residence
G. Navy by Correspondence
H. Marines in Residence
I. Marines by Correspondence
J. Armed Forces in Residence
K. No Record of Completion

16. Senior Service School

A. Air Force in Residence
B. Air Force by Seminar
C. Air Force by Correspondence
D. Army in Residence
E. Navy in Residence
F. National War College in Residence
G. Industrial College of the Armed Forces (ICAF) in Res.
H. ICAF by Correspondence
I. No Record of Completion

17. Command Experience

A. Yes
B. No

18. Highest Staff Assignment

A. Wing
B. Numbered Air Force
C. Major Command
D. ESC
E. HQ USAF
F. Higher than HQ USAF
G. None

19. AFESC Tour

A. Yes
B. No

20. Overseas Assignment

A. Yes
B. No

21. Total Number of Assignments in the Last Ten Years

A. One
B. Two
C. Three
D. Four
E. Five
F. Six
G. Seven
H. Eight
I. Nine
J. Ten
K. Eleven
L. Twelve
M. Thirteen or more

22. Total Number of Duty Location Changes in the Last Ten Years

A. One
B. Two
C. Three
D. Four
E. Five
F. Six
G. Seven
H. Eight
I. Nine
J. Ten
K. Eleven
L. Twelve
M. Thirteen or more

23. Number of Different Major Commands Served In

A. One
B. Two
C. Three
D. Four
E. Five
F. Six
G. Seven
H. Eight
I. Nine or more

24. Majority of Career Spent In Which Major Command?

A. MAC
B. TAC
C. SAC
D. AFLC
E. PACAF
F. USAFE
G. AFSC
H. ATC
I. Other

25. Percentage of Career Spent In Majority MAJCOM (In Percent)

26. Experience in Civil Engineering

A. One
B. Two
C. Three
D. Four
E. Five
F. Six
G. Seven
H. Eight
I. Nine
J. Ten
K. Eleven
L. Twelve
M. Thirteen
N. Fourteen
O. Fifteen
P. Sixteen
Q. Seventeen
R. Eighteen
S. Nineteen
T. Twenty
U. Twenty-one or more

27. Number of Awards, Decorations, and Oakleaf Clusters

A. One
B. Two
C. Three
D. Four
E. Five
F. Six
G. Seven
H. Eight
I. Nine
J. Ten
K. Eleven
L. Twelve
M. Thirteen
N. Fourteen
O. Fifteen
P. Sixteen
Q. Seventeen
R. Eighteen
S. Nineteen
T. Twenty
U. Twenty-one or more

28. Highest Award or Decoration

A. Medal of Honor
B. Air Force Cross
C. Distinguished Service Medal
D. Silver Star
E. Legion of Merit
F. Distinguished Flying Cross
G. Bronze Star
H. Defense Meritorious Service Medal
I. Meritorious Service Medal
J. Air Medal
K. Air Force Commendation Medal or lower

Appendix B: Research Database

1. CLGADBHAFAEBBABGAEBAGFFH25TGE
2. BHJADBHAFAEBBABHADAAFDFF30QEI
3. BNHADBCACBEBBBAGAEBAIDEH50AIE
4. CMGABBHABBEABACCAEBAFFFF15SIE
5. BKIADBHADBEABBKHAEAAFCFH24SEG
6. BNGADBHADBEABAAGACBADDFG35RGE
7. BGCAABCADBEBBABBACBBJCCA40AFF
8. BKIADBCCDBEABBKHACBAKCDC50FQF
9. BOIADACAEAEABCKHACBAGFDF39HMF
10. BIJADBCABBBBBBBHAGBBKGCA78AQF
11. BJGAEBHAFBEBBBCHAEBAIEFB43PHG
12. BOJABBCAEAEBBBCHAEBAGCFI25KME
13. BIHADAHACBHABBBAADAAHFGI40TGG
14. BJFAEBHACAEABAACBEBAFEGD22RFG
15. BMFADBCADBBBBBKHABBAHEBC88BHI
16. BKFACBFACBEABAAHACBAGDDA58MIF
17. BEGADAHDABEBBBAGAEBALHEI14PEE
18. BMEADBHAEBEBAACHAEBAJFDE39RGI
19. BLIAFACAEBBABAKHAEBAJFCC72IJG
20. BNKADBCACAEABBKIADAAIDDA76MHE
21. BNHADBHADBEABCCBACBAIFCH61RGE
22. BJEADAHAEBFABAJBACBAIDEI26PGG
23. BKIADAHACBEABACIACBAGEGG26SFG
24. BOIADBFAEBEABBAHAEBAHDGB25TFE
25. BOJADBFACBEBBAAIADAAGDFC28IGI
26. BNGADBEAEAEABCKHAEBAHEGC260CG
27. BJFAEBHAEBHABCKIBCBAFDFI28REG
28. BNIADBFADBEABABBAEBAHDFC35NDE
29. BSEADBHABBEABCCHACBAGDFB32SDG
30. BMJACBCAEAHABACCADAAHEFI25HLF
31. BHIADBHADBEABCBIACBAHEEC40TFG
32. BJGADBHACAEABCBHACBAGDEG41RFG
33. BQJAFBCAEAEBBBKHACBAGBDC74DIF
34. BHJADBHAFAEABCKGBEBAIFIF16SH
35. BIEADACAEBEABACHAABAHFFF35GUF
36. BJIADBHADBEBBAAHAEABHDEG32RFI
37. BIBADAHADBEABBCHACBAGCEG26SEE
38. BKBAEBHAEBEBBAKCAEBAFDFA45THI
39. BLKADBHAEDEBAACBACBAGDEF44RDG
40. BHGAEBHADBFBBBAGAEAAKECF470EG
41. BMJADBHADAEBBBBGAEBBHDGC22RFG
42. BNEADBHADBBABAKAAEBADCGD25TEE
43. BMJADBHAGAEBBCAGBEBAHEFF14UDE
44. BPHADBHABBEABCJIACBAEDGC32TDI
45. BJEADAHADBHABCJAACBAFFGA21SFE
46. BLFADBCADAEABAJAACBAMGEH60FQE
47. BMHADBHADBEABAKIAEBAEDFB35TEI

48. BFDAABBADBEBBBAGAEBAIFEB41IUE
49. BHIAABCADBEAABCIAABAHCBC83FJI
50. BQIADAHAEBEBBCAGAEBAGEHF21SHE
51. BLHADAFAEABABAKEACBAGEFB53DPF
52. BKHADBFADBEBBAAHACBAIEEC26KNF
53. BSEADBHABBEBBBCHAEBAIEEC44RDI
54. BMIADBHADBBABAKAACBAHGGI22PEG
55. BOIADBFAFAEBBAKHACBAFEDF45LOF
56. BJCADBHACBEABACHAEBAHEGI21SDE
57. BJJADAHAEBEBB ADACBAJFEF31PEE
58. BIDADAHAEBEABAJIAEBAHFFB41QDI
59. BPIADBCABBGABCAHAEBAHEFF20RJF
60. BKJADBCAEBEAAACIAABAHDDC45GJF
61. BFCAEAHABBEBBCAIBEAAJGFI11RHG
62. BPJADAFADBEABBAIAEBAEEFE19RDG
63. BKKAEAHACBEABCABAEBAGEEC38PEG
64. BLEADBHAEAHABBCCACBAHEFF25NEG
65. BMEADBFAEBEAABKAAEAAGEGI20QIE
66. BLJADBCACBEBBBABAABAHECC72IJF
67. BKGADBHABABABACHACBAEDEC56RFG
68. BJIADBHAEBEABBBHACBADCEE28REG
69. BBJAABHADAEABAJGAEBAIFFC200CG
70. BKEACBFACBEABCJBAABAIFEC40GHI
71. BMIABBHACBEABAKHACBAHEFA32NCG
72. BIKADBHAEBEBBAAGAEBAGEDC31PGI
73. BNGADBCABBBABAKBAABAFDEB42ITF
74. BLKADBHADBEBBACFBEBAFDFI28NEI
75. BLIAEAHADBEABABBAEBAFFFB26SGG
76. BIEAABDADBEABCABAEBAHDEA50REG
77. BJIADBCADBEBBBCIABBAGFCC76LOF
78. BOHADBHACBEBBCAAAEAAFEFE26SFE
79. BOKAFBFAGBBBBBKAACBAGEBC81ALH
80. BMEADBHAEACBBCACAEBAJEEC41QGG
81. BIDADBHADBDABCBCAEBAEDGA25TE
82. BIFADAAACBEBBCBBABBAHFDH32SEI
83. BOIADAHABBEBBAKABEBBGDDG56RFG
84. BGJADBHADAEABBCABEBAIEFF24QEG
85. BLIADBHADBEBBAAHACBAGFFB30TEG
86. BOGADBCACBBABBKIADAAFDEH58NEI
87. BRGADBHACAEABBCAACBAHEGI220HG
88. BJIAEBHACBEABBAHACBAGFFG32SDI
89. BFBAABCADBEBBBBAACBAIEFA47AJF
90. BNIADAFAGBEABBJGACBAHFFB37PNF
91. BJIAFABADAEBBBCIAABAFDEB37KLF
92. BLIADAHADBHABAJIBDAAFADG53SCI
93. BQCAFBGAEBEABBCCACBAFEDF43UBI
94. BRKAFBCABABABBCIACBADDEE240PE
95. BIJADAHAEBEABACCACBAFDEE20TEG
96. BFFAABHACCEABBCAACBAFEGF26TCI
97. BOGAEBHAEBEAABCHACBAFEFC26MFG
98. BKFADBHADAEABCBCADAAGEHI21SGG
99. BIEADBHAEBEABBBGAEBAHGFH28RFG

100. BIEADBHADBHBBBBBACBAGEDE37SBI
101. BOEADBHACBBABAJAAEBAFDFC22REE
102. BJJAEBHAHAEBBAAGAEBAHFFH28SEG
103. BPJADBCADABABAKIAABABACA76MFF
104. BKIADBHAEBEABBCHADAAFCFB240DG
105. BMHADBHABBCBBCKGAEBAGFEI20SFE
106. BJIADBHAEBEAACBHADAAHFCB47SGI
107. BNIABBCAEBEBBBKAACBAEEEC620RF
108. BGIAABHADBEABACAAEBAFFFE33REG
109. BLFADBFADBEBBAAGADBAGCDB37LGG
110. BNIADBCACBEBBBJAACBAFFDC58FIG
111. BGIADAHAEBHABCCAAEBADDDF33RDG
112. BOFADACAEBEBBCBAAEBAGEGF15QIE
113. BLFADBHAEBHAB JAACBAGECI59GEE
114. BPEADBCBCBBABACIACAAHEEC42IGE
115. BNHADBFADBEBBAKHABBAFCDA60FHE
116. BPIAFBCACBEBBBKHAABAGDFB44GEI
117. BKEADBCADBEABAABACBAHEFB38AUF
118. BPGACBHAEGEAACKHACBAGEFC22KDG
119. BHIADBHADBEABBBAAEBAFEGB26SGG
120. BKHADBHBBBEBBACFBDBAJFFF24NGG
121. BIKAABCADBEABCBBACBAIGEA24IUI
122. BIGAFBFAEBEBBAAHACBBLEAC86APF
123. BKHADBHACBEBBCBIACBAGDFI35QFI
124. BJFADACACGEAAACGACBAKGFH26NUI
125. BMFABBDACBEABCADAEBAFDHF16SFG
126. BMEADBFADBEBBBKAACBAEEDC65PMF
127. BHJAEACACBEBBACBACBAHEDA64FDI
128. DPJADBHAFAEBBBAGAEAAFDEI25THE
129. BICADBFAEBEBBACHACBAJEDB53LRI
130. BOBADBCACBEABAKGAEAAGFEE26PHE
131. BPFADBCACBEABCKAACBAGEFC29ISD
132. BMIADBHADBHABAKHBDAAGCEG55TEG
133. CLEACBHADAEBBAKGAEABEDFB24UFE
134. AKFADBHADBEBBAABADBAFDDH47SGG
135. AREADBCABBEABBKHBEBADCDH36QDI
136. AKGADBHADBEABCBBBEBAHFFF24QFG
137. APCADBHAEABABAKBBCBAEEEG37SDG
138. ALGADBHADAEABBCHBEBAFDFC25TGI
139. AICADBHADAEBBABIABBADCDC67EFG
140. AKJADBHADBEABACHACBAEDDC58SCI
141. ANCADACBCBEBBCBHACBBIDCC89DRF
142. AKEADAFAEBEABBBBABBAKEEA44IIF
143. AQIACBCACBEABAKHACBAGCDB33RKF
144. AKAAEBHABBBABACCACBAHEHC28RFG
145. AJCADBCAFBEBBBAIBCBAHEEH35BJI
146. AJBADBHAFEEABACIACBAGDHI15THI
147. AHGAEBBAEABABCBIAABAJBEF29DGF
148. AIDADBHADAEABCBIBCBAFDGF28TDI
149. AMAADAHAEEEBABACBBAAFDEE32SFG
150. ANFADBHADBFBBCCIBEBAIEEH43UFG
151. AKJADBHBDBEABCBIACBAECEE33UDG

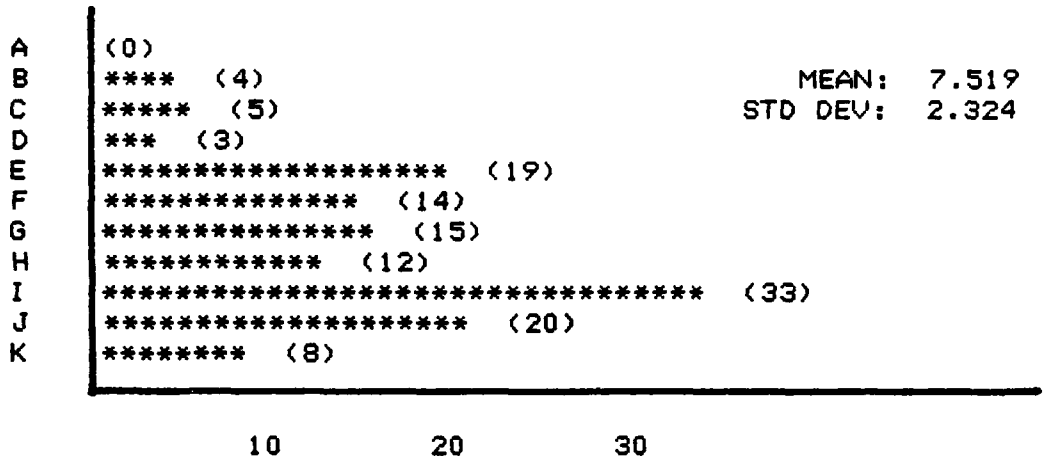
152. ANIADBEABBBABAKIAABAFCCA68HHI
153. AIGADBCADBEAABBBBCBAGFDH50GUF
154. ANGADAHAEBBABBABAEBAFCEF55TFG
155. AKJADBHACAEABBCIBEBAFEGF35TFI
156. AIGAEAHADAEABBCHBCAAGEFG32SDG
157. ANJADBHAEBEBBCBHAEBAEDHH21SEG
158. AHEADBHADBEABBCHBEBAFDGC15TFH
159. AMAADBHADBEABACBAEBAEBGF30TBH
160. ALEAEBHADBEBBABHACBAGCDE42SEI
161. AIIAEBHAEBEBBCBHACBAFEEB33PGI
162. AIHADBHDABEBBBCIBCBAFDCG68HCI
163. AOGADBHACBEBBACBBDBAGEGG30TJG

Appendix C: Variable Histograms

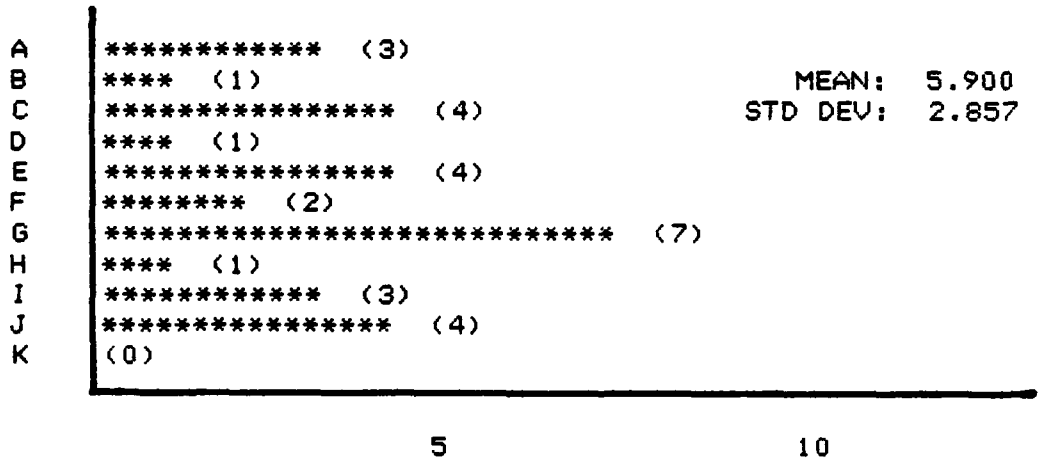
NOTE: The title of each histogram is at the top of each page with the appropriate question number (Q-1) refering back to Appendix A. The vertical axis on the following histograms are the possible data points listed in Appendix A. The horizontal axis represents the number of cases.

BIRTHPLACE (Q-3)

Successfuls

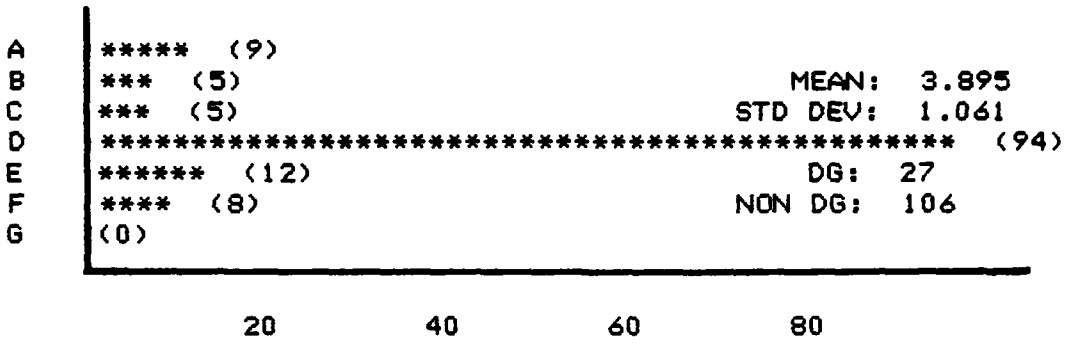


Unsuccessfuls

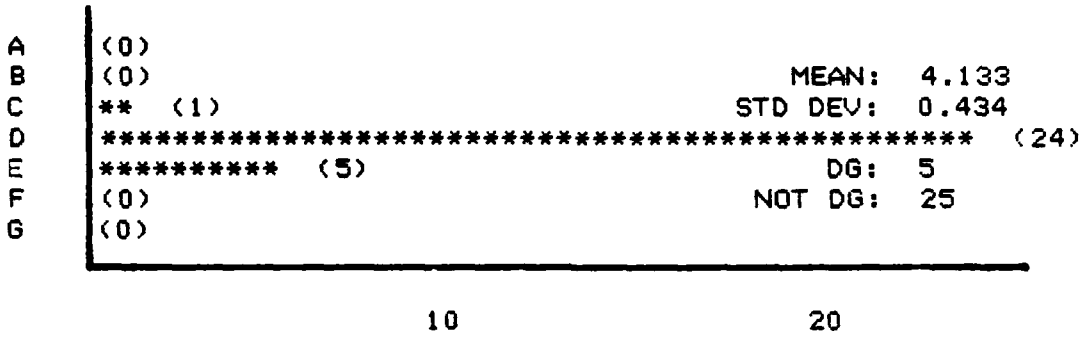


COMMISSIONING SOURCE (Q-5)

Successfuls

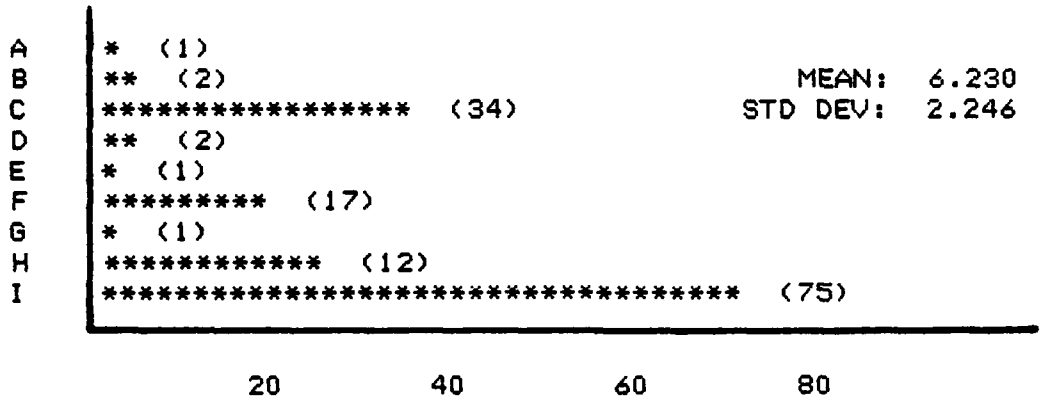


Unsuccessfuls

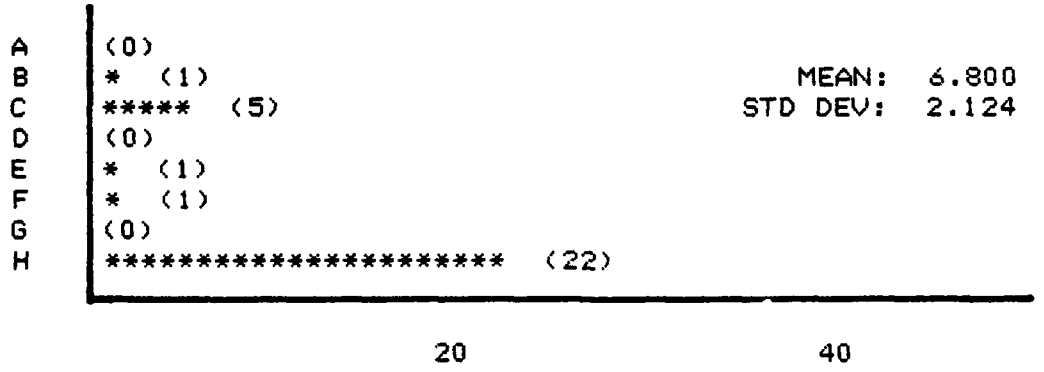


AERONAUTICAL RATING (Q-7)

Successfuls

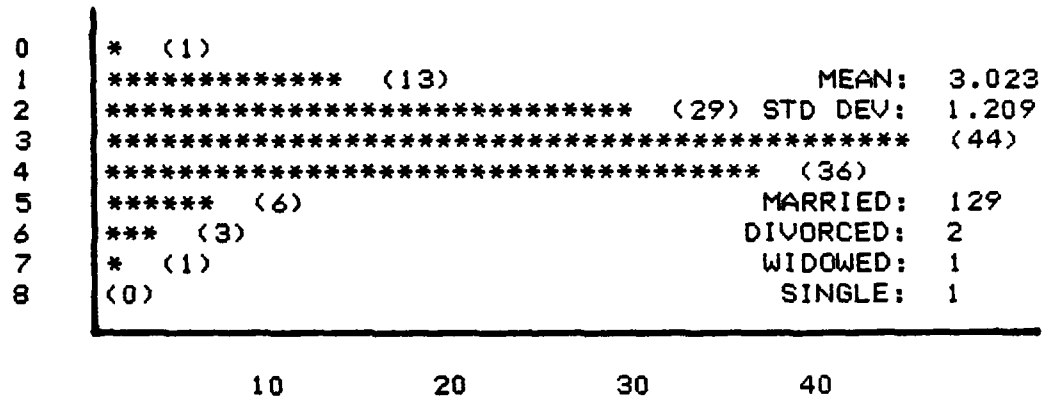


Unsuccessfuls

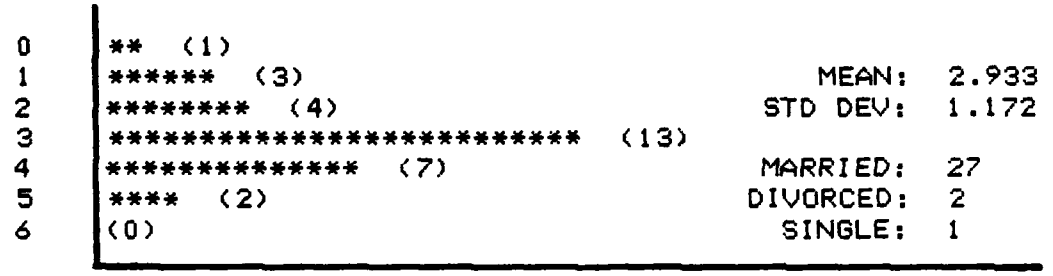


TOTAL NUMBER OF DEPENDENTS (Q-9)

Successfuls

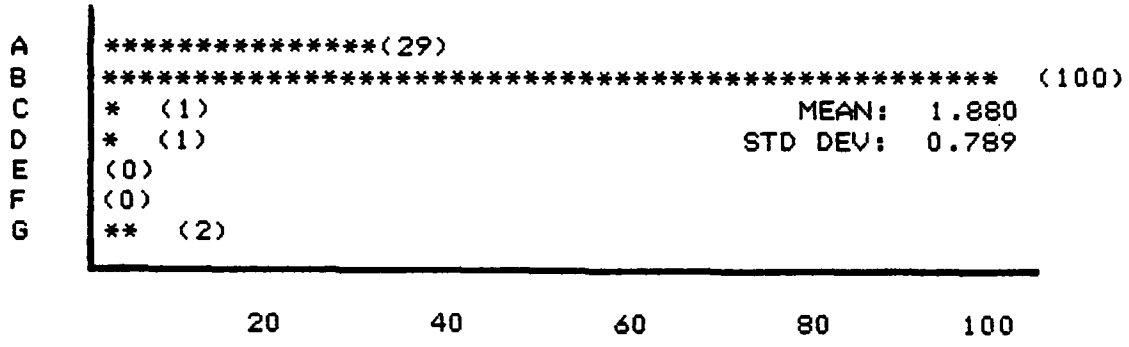


Unsuccessfuls



RELIGION (Q-10)

Successfuls



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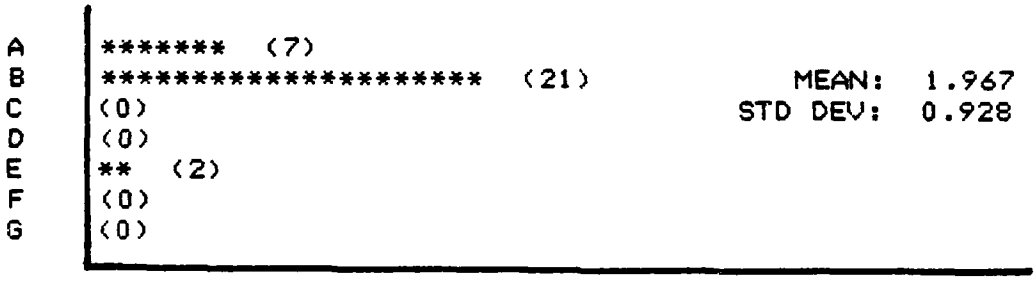

AD-A146 873 PROFILE OF A SUCCESSFUL CIVIL ENGINEERING CAREER IN THE 2/2
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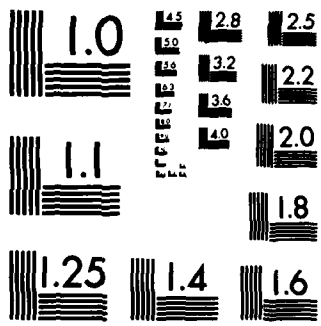
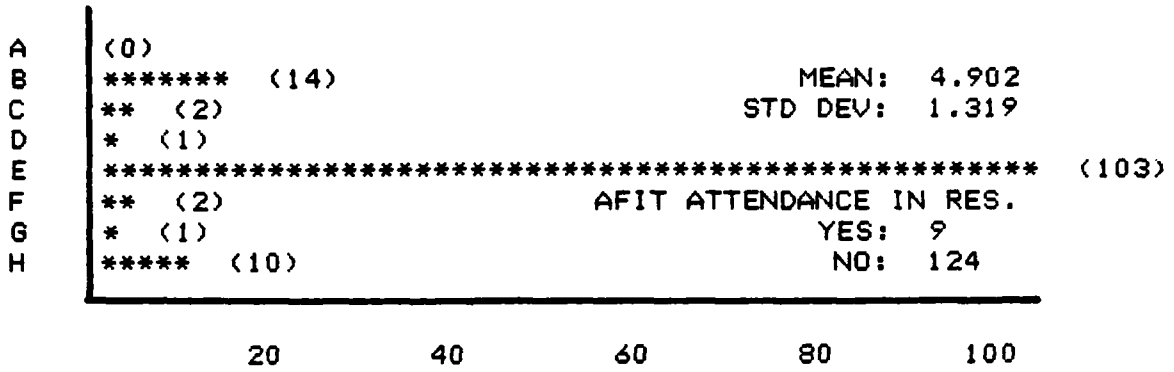
UNCLASSIFIED SEP 84 AFIT/GEM/LSM/84S-5 F/G 5/9 NL



OPY RESOLUTION TEST CHART

HIGHEST EDUCATION LEVEL (Q-11)

Successfuls



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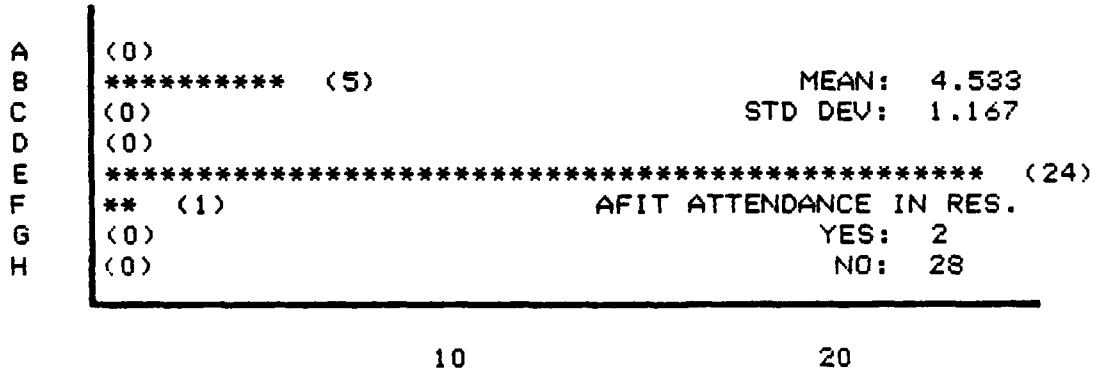
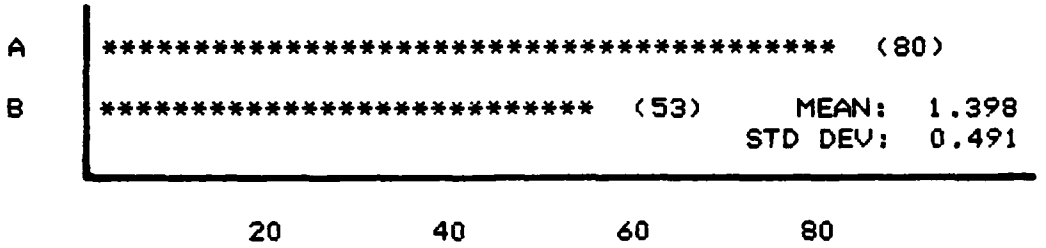


HIGHEST EDUCATION DEGREE (Q-12)

Successfuls



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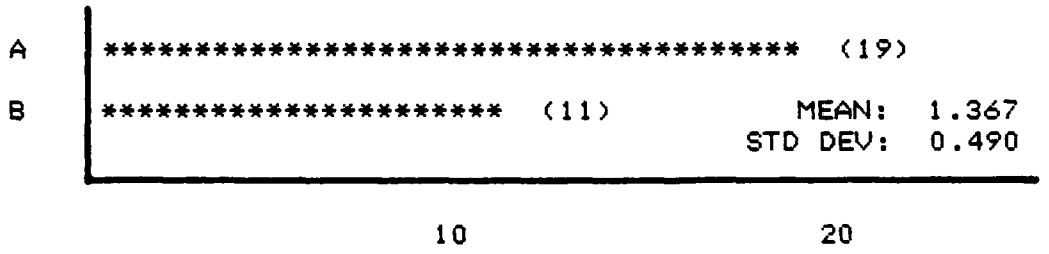
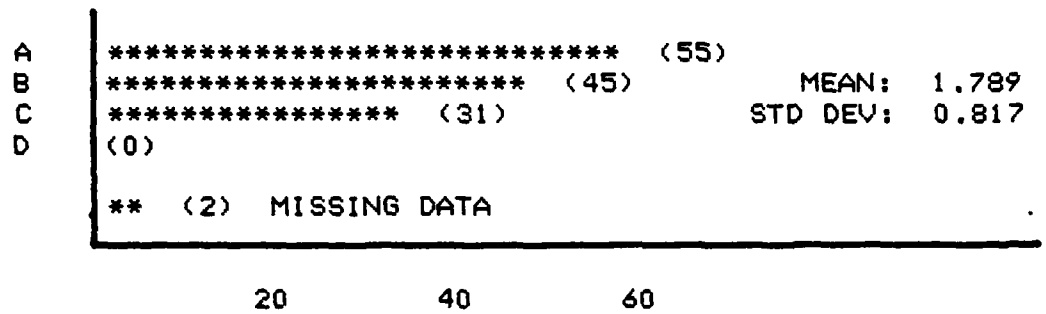


SQUADRON OFFICER SCHOOL (Q-14)

Successfuls



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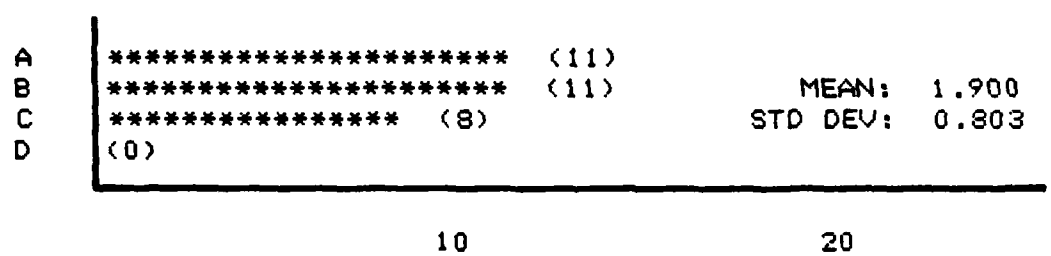
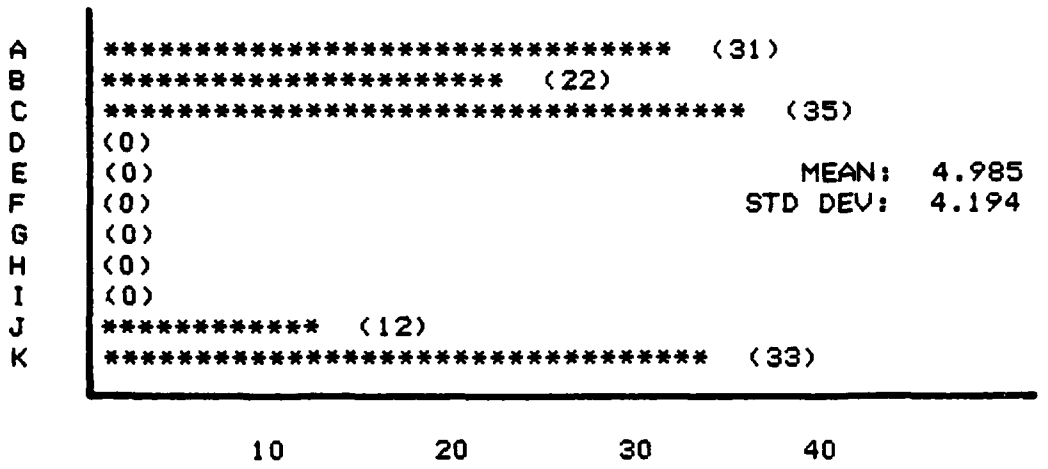


INTERMEDIATE SERVICE SCHOOL (Q-15)

Successfuls



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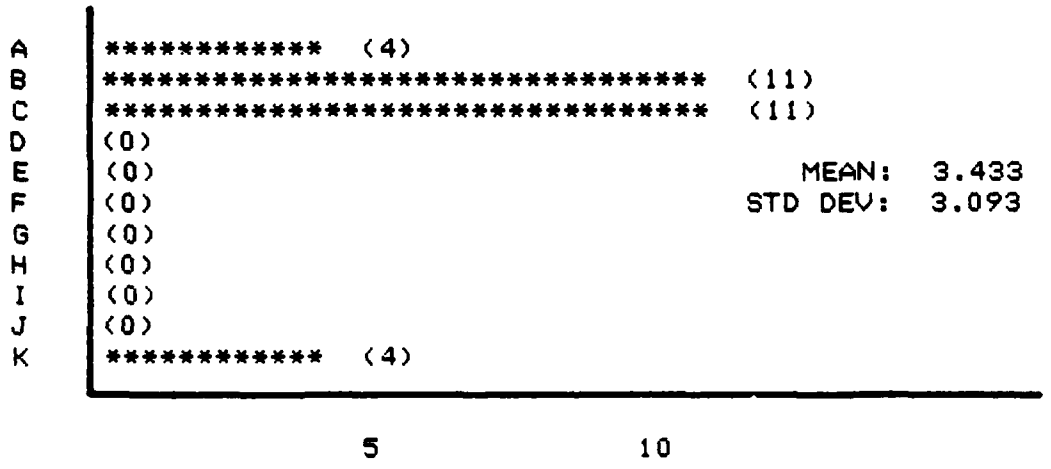
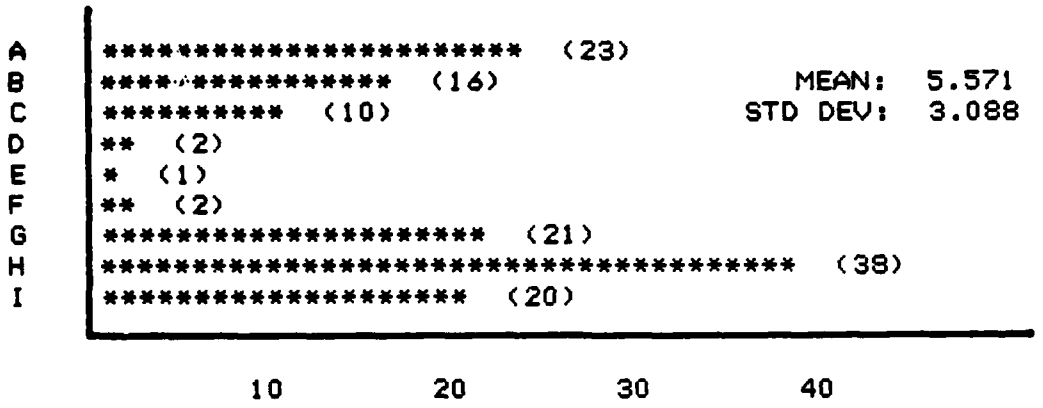


SENIOR SERVICE SCHOOL (Q-16)

Successfuls



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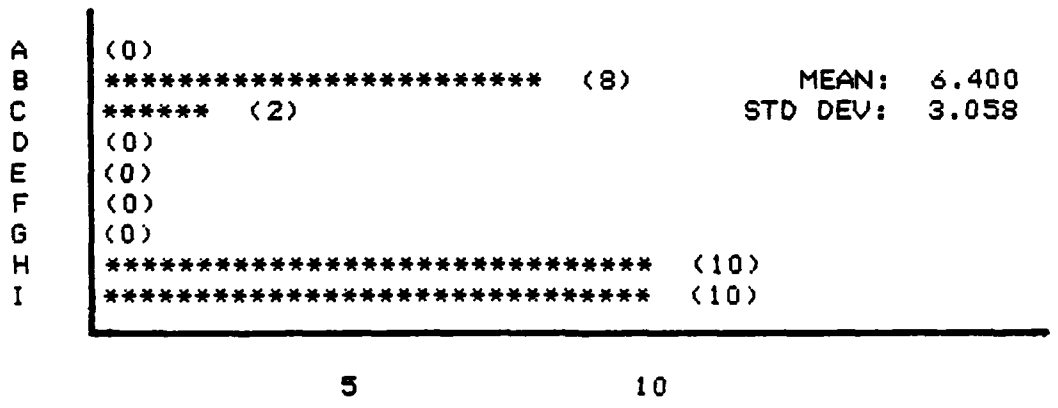
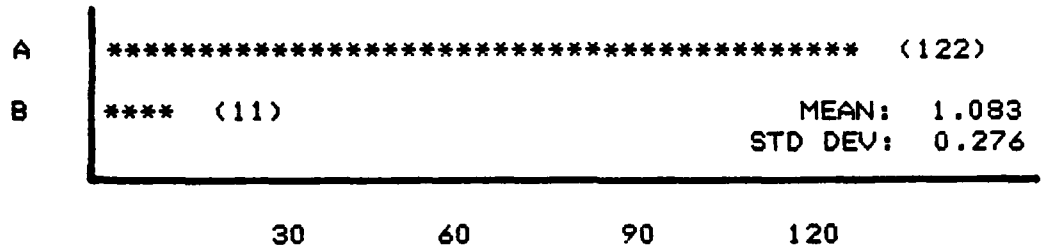


COMMAND EXPERIENCE (Q-17)

Successfuls



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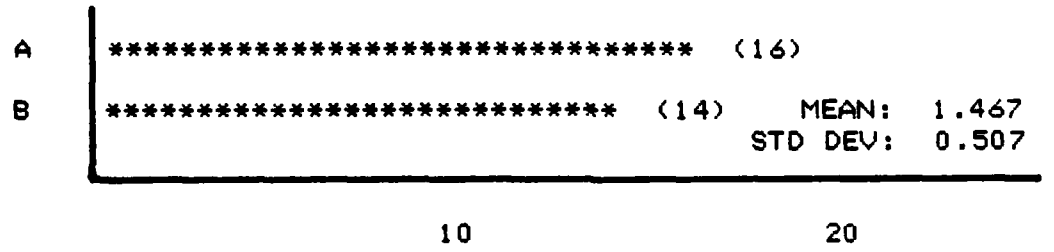
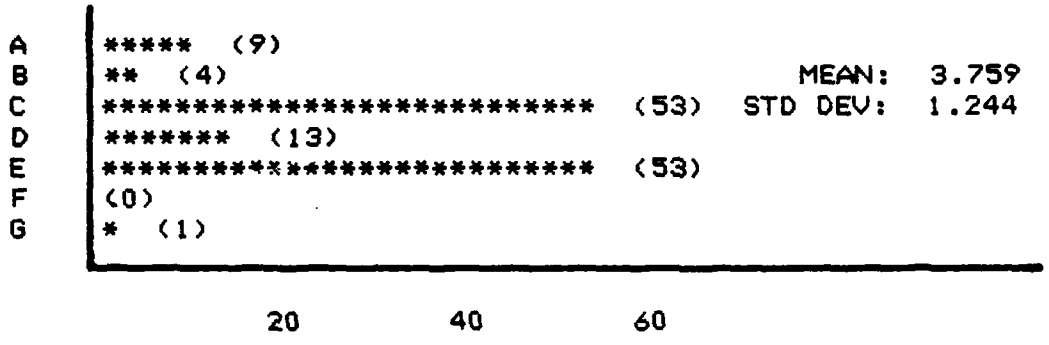


STAFF EXPERIENCE (Q-18)

Successfuls



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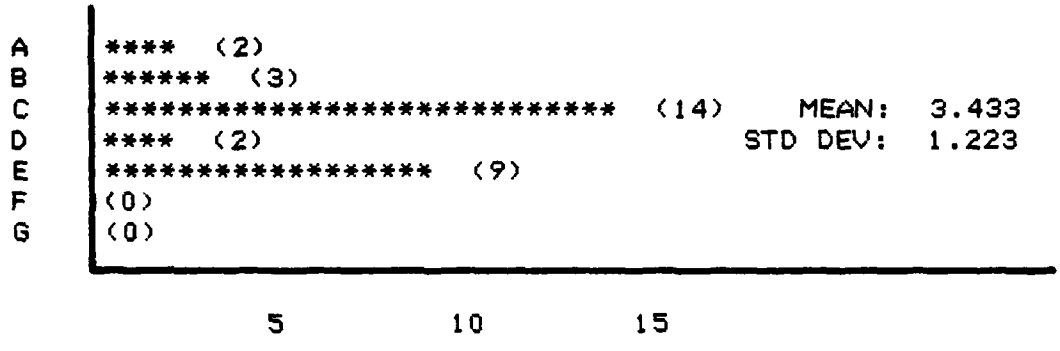
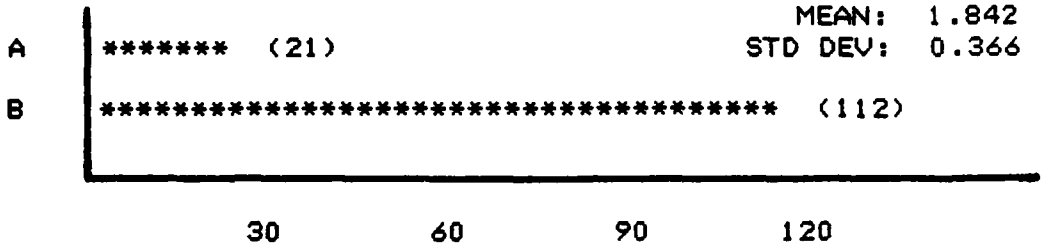


AFESC TOUR (Q-19)

Successfuls



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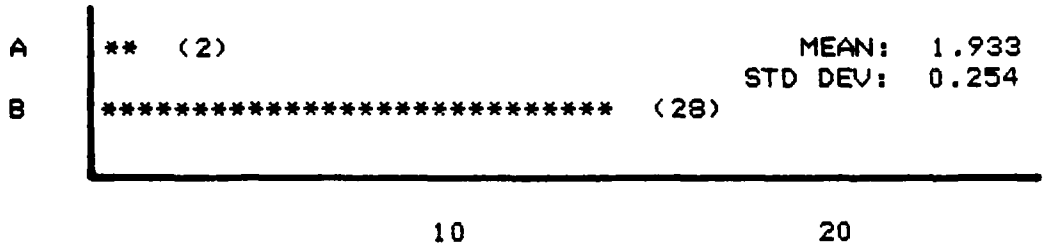
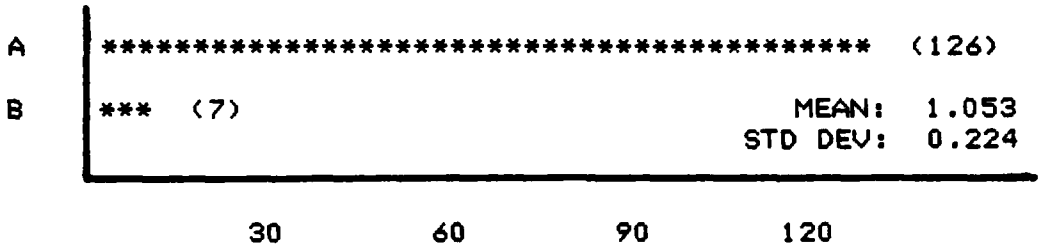


OVERSEAS ASSIGNMENT (Q-20)

Successfuls



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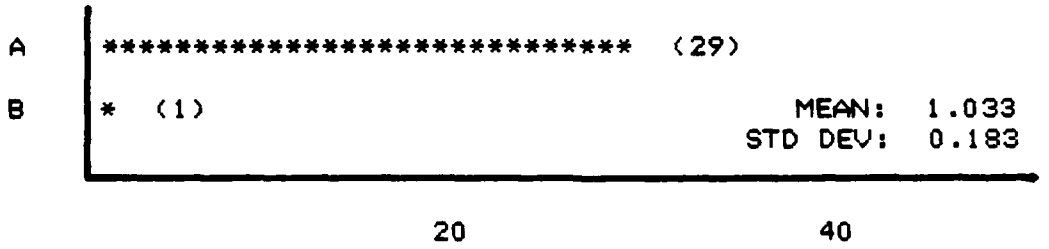
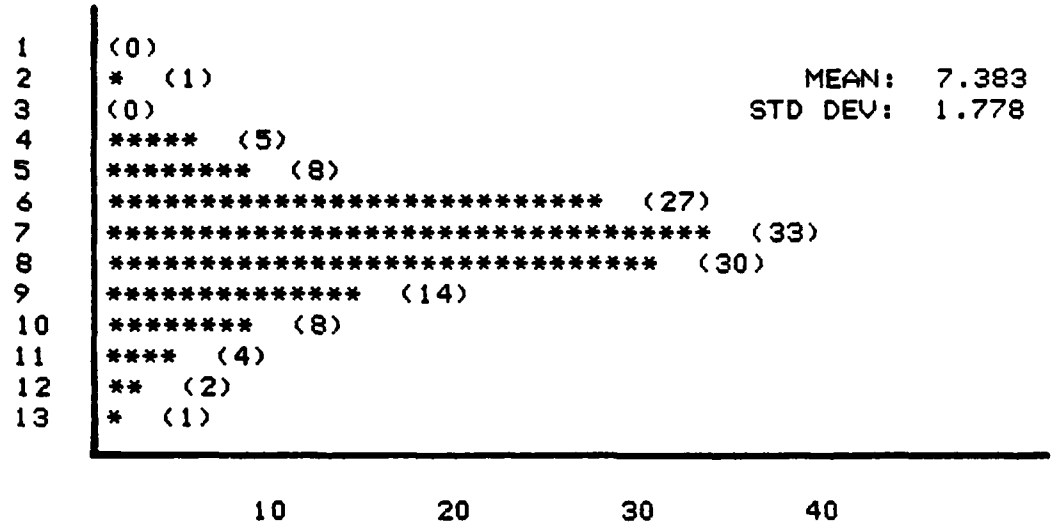


NUMBER OF ASSIGNMENT CHANGES (Q-21)

Successfuls



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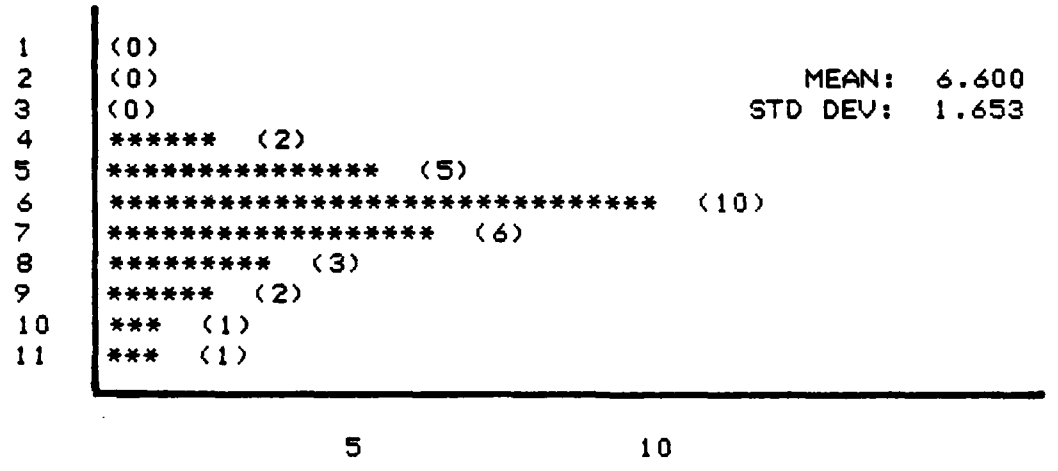
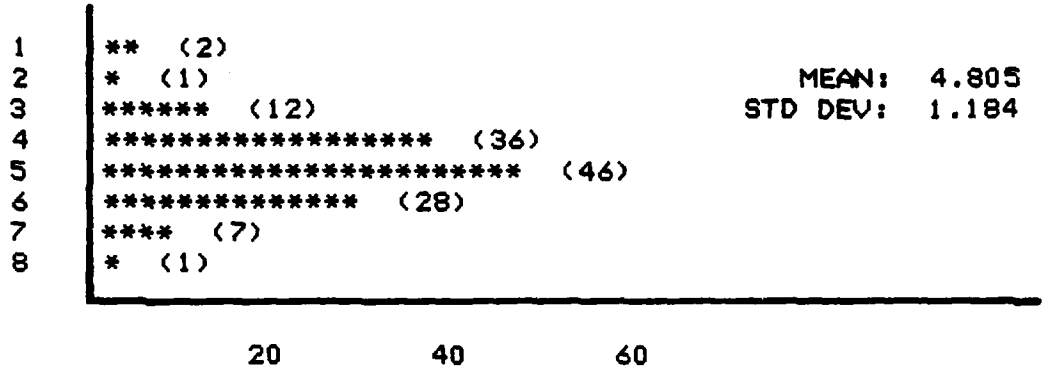


NUMBER OF DUTY LOCATION CHANGES (Q-22)

Successfuls



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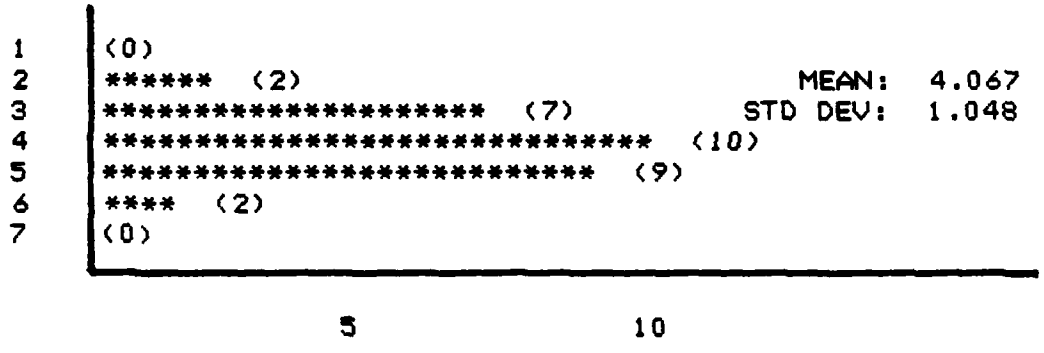
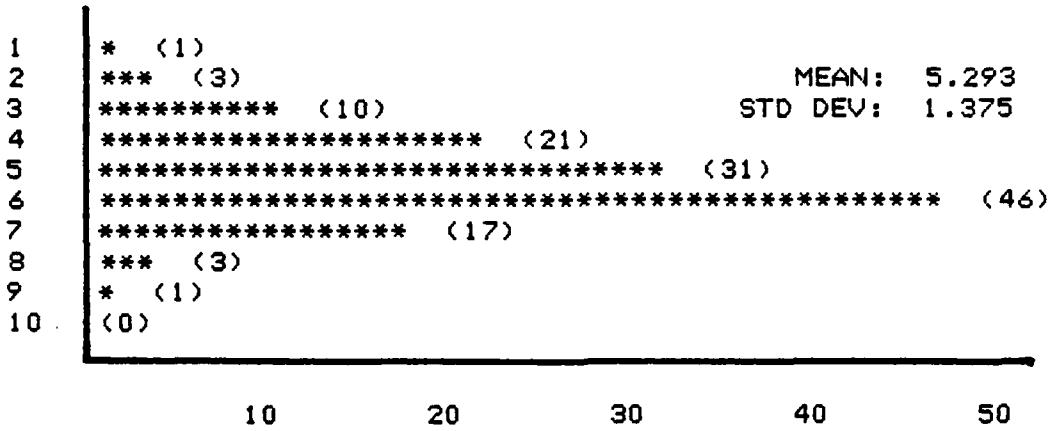


NUMBER OF DIFFERENT MAJCOMS ASSIGNED TO (Q-23)

Successfuls



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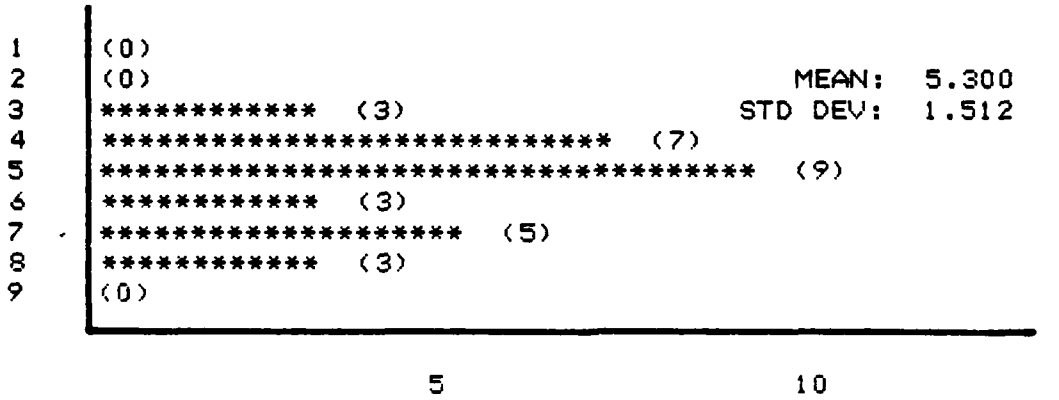
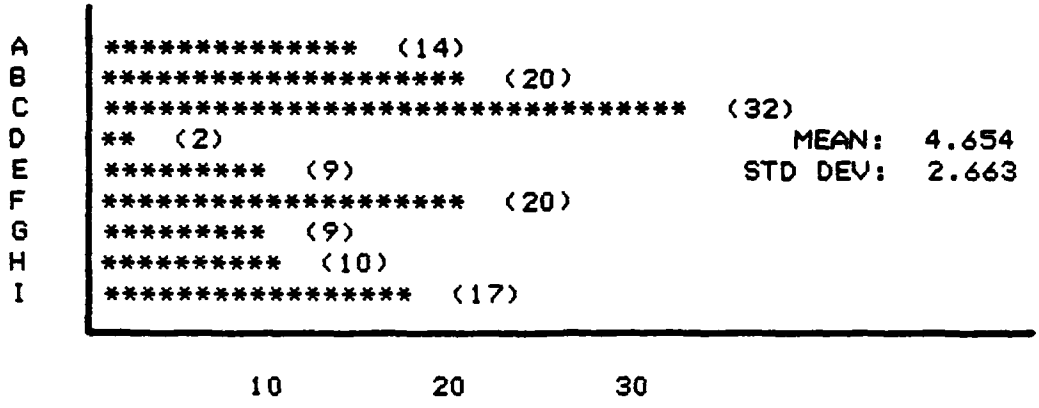


CAREER MAJCOM (Q-24)

Successfuls



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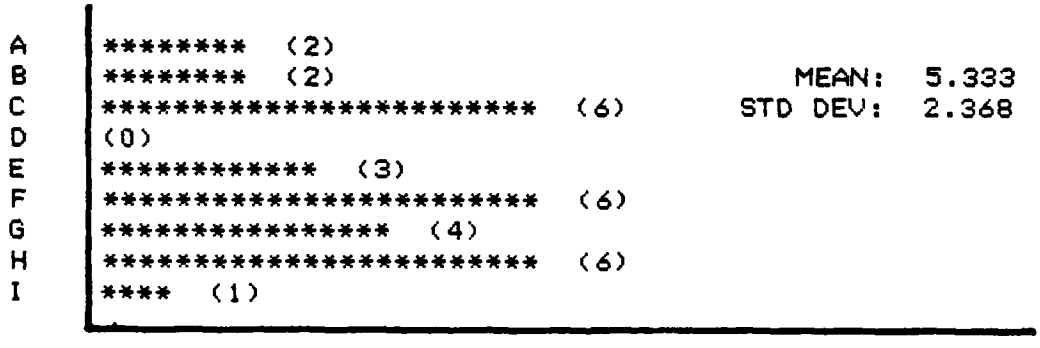
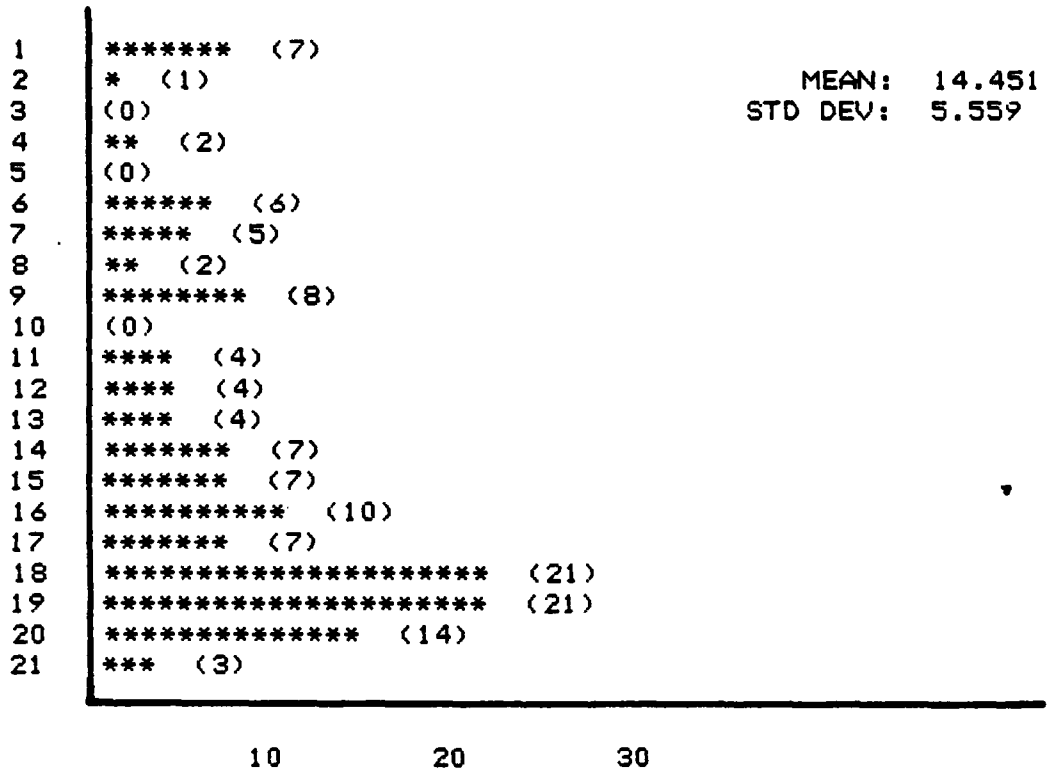


CIVIL ENGINEERING EXPERIENCE (Q-26)

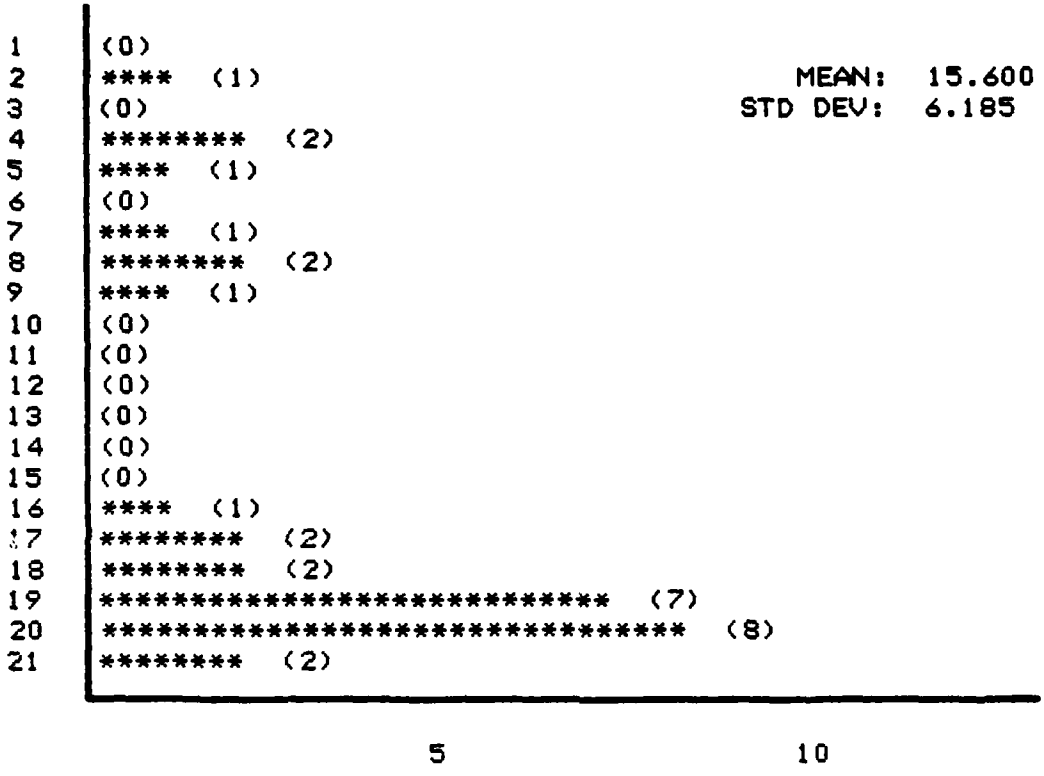
Successfuls



MEAN: 14.451
STD DEV: 5.559

CIVIL ENGINEERING EXPERIENCE (Q-26) (Continued)

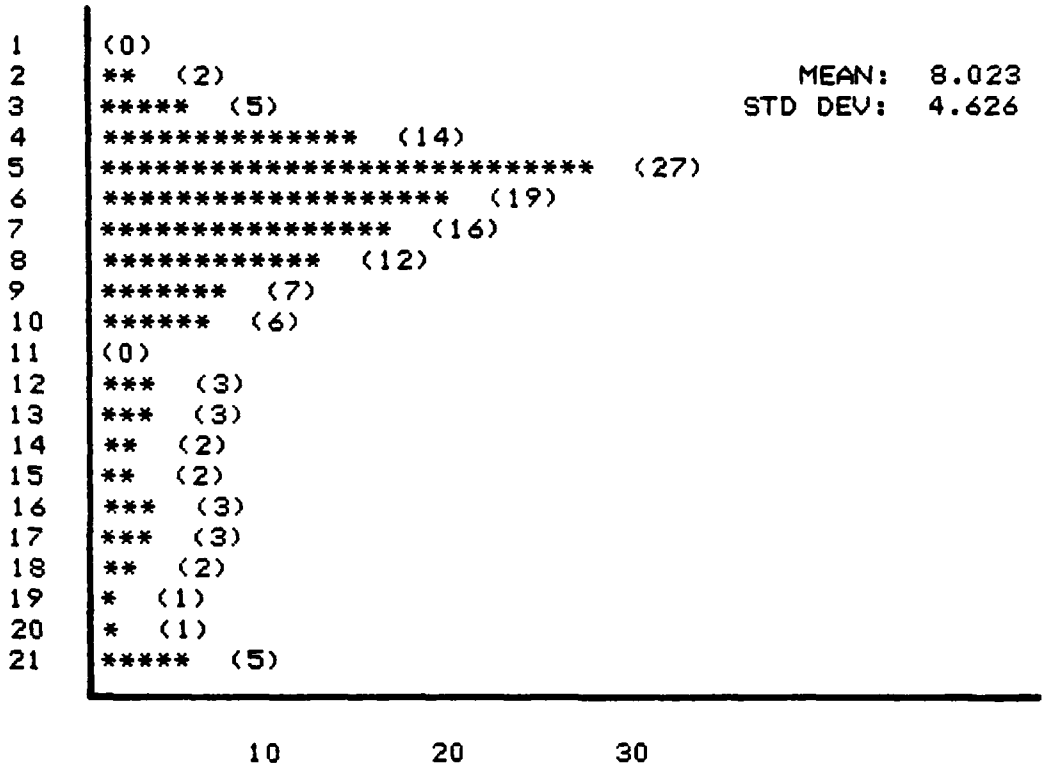
Unsuccessfuls



MEAN: 15.600
STD DEV: 6.185

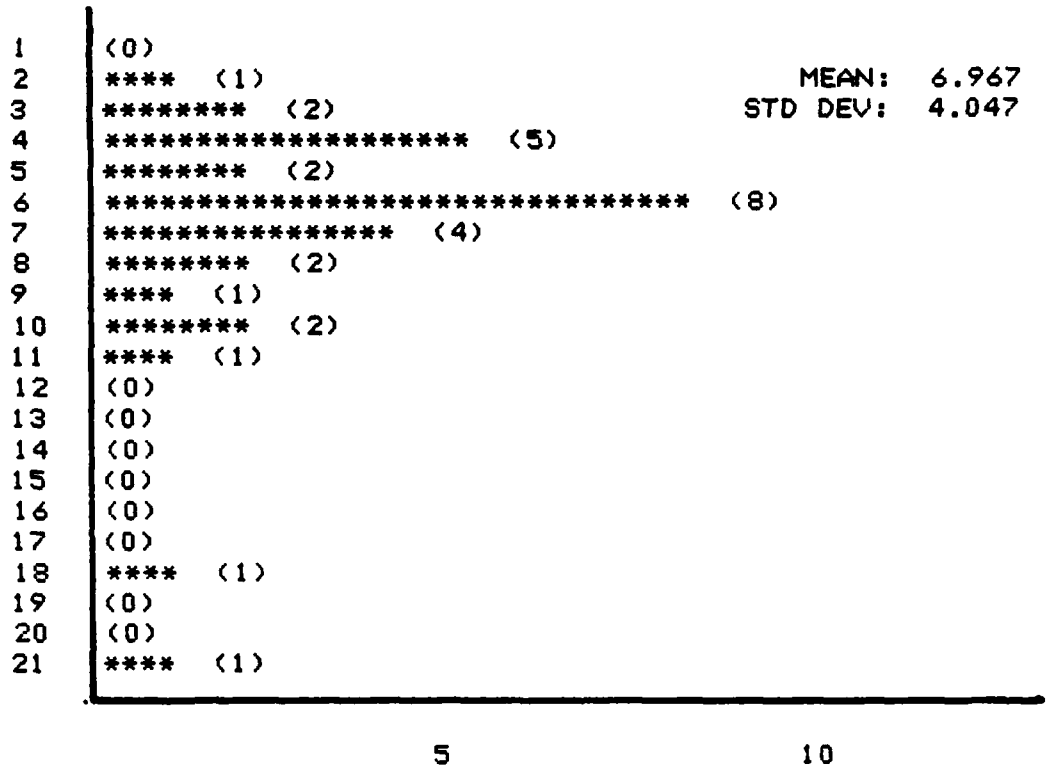
NUMBER OF AWARDS (Q-27)

Successfuls



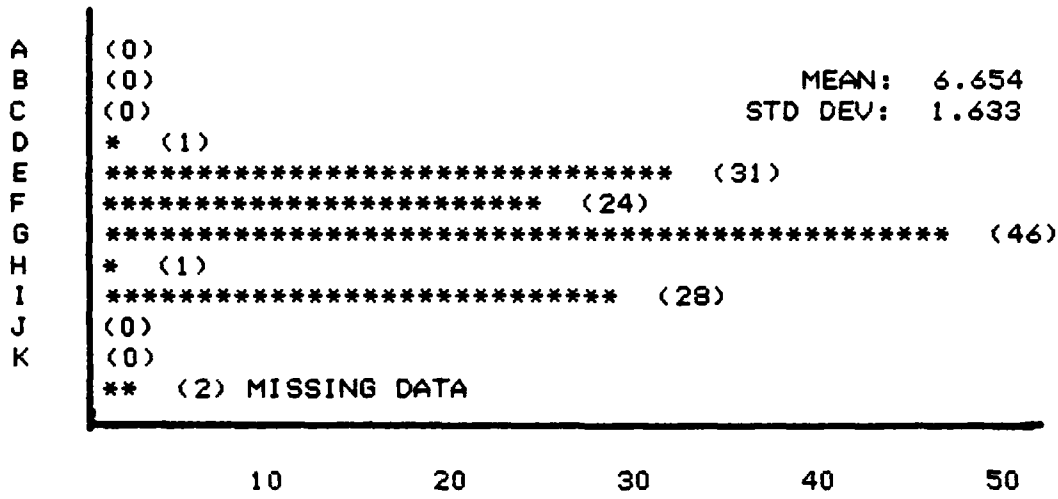
NUMBER OF AWARDS (Q-27) (Continued)

Unsuccessfuls



HIGHEST AWARD (Q-28)

Successfuls



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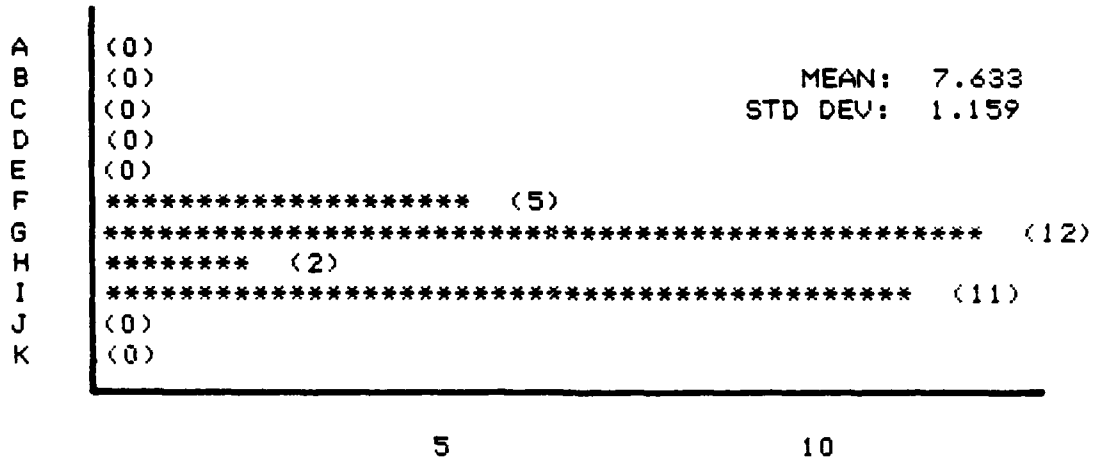

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Vita

Captain James R. Cady was born on 3 March 1953 in Ashland, Oregon. He graduated from high school in Ashland, Oregon, in 1971 and attended Oregon State University for one year prior to attending the United States Air Force Academy. He graduated with a Bachelor of Science degree in Civil Engineering on 2 June 1976. Upon graduation, Captain Cady received a regular commission as a second lieutenant in the United States Air Force. He attended undergraduate pilot training at Williams AFB, Arizona and received his wings in July 1977. He then served as C-141 copilot and aircraft commander in the Eighth Military Airlift Squadron, McChord AFB, Washington. Also, he served as a Wing Contingency, Exercise, and Operation Plans Officer at McChord AFB until entering the School of Systems and Logistics, Air Force Institute of Technology, in May 1983.

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FIELD	GROUP	SUB. GR.	Career Development, Promotions, Career Progression, Officer Career Management
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Title: PROFILE OF A SUCCESSFUL CIVIL ENGINEERING CAREER IN THE UNITED STATES AIR FORCE

Thesis Chairman: Alan E. M. Tucker, Major, USAF

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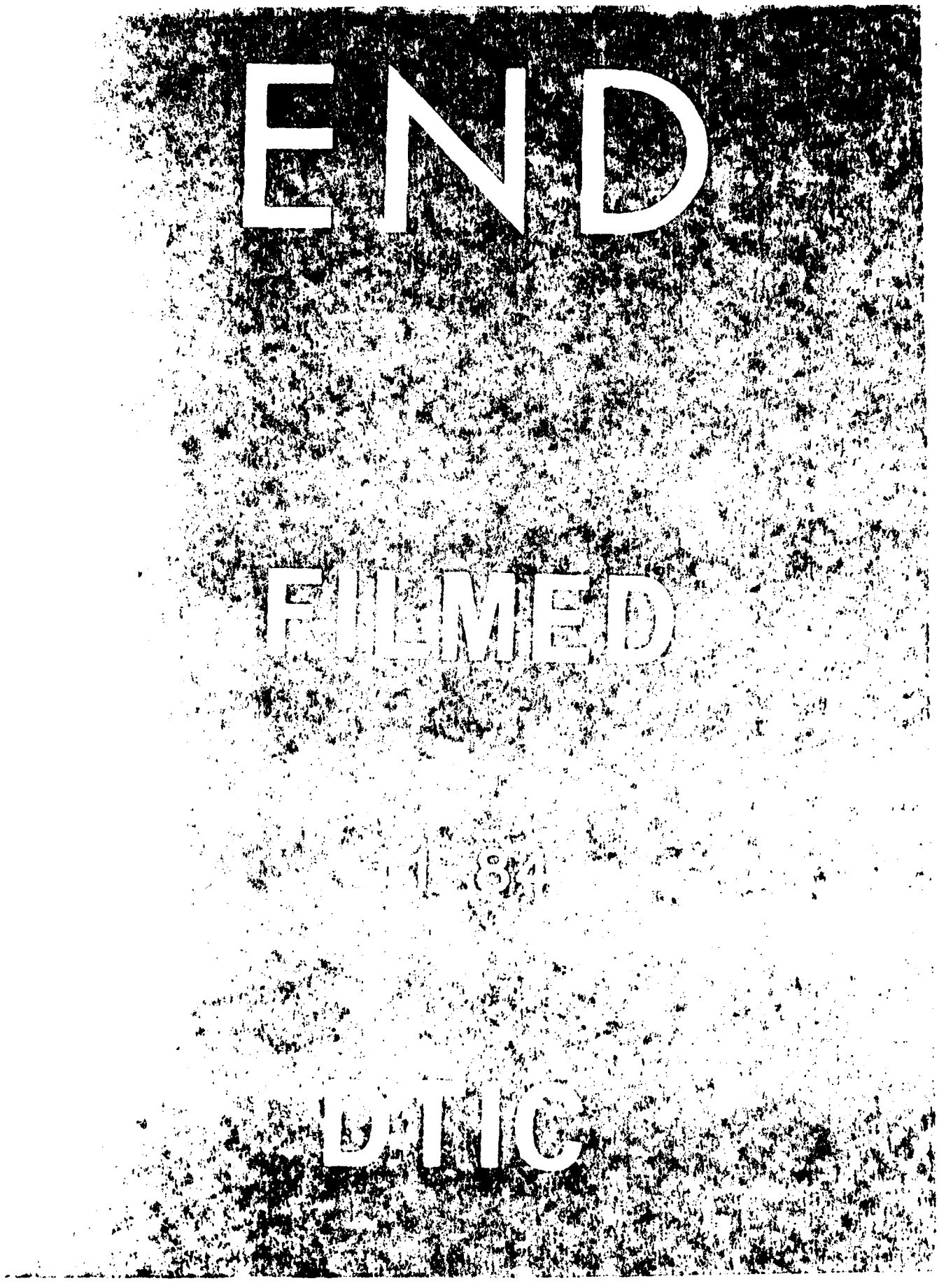
SECURITY CLASSIFICATION OF THIS PAGE

This research developed career profiles for successful and unsuccessful United States Air Force civil engineering officers. Also, this research identified those characteristics that best discriminated between the successful and the unsuccessful civil engineering officers.

Two populations of officer career briefs were selected for analysis. One population consisted of colonels, brigadier generals, and a major general; while the other population contained lieutenant colonels non-selected at least twice for promotion to colonel. Both populations contained officers serving in the civil engineering career field as of 18 February 1984. For the purpose of this study, success was defined as attaining the rank of colonel or above and currently serving in the civil engineering career field.

Selected variables from the Air Force Manpower and Personnel Center computer personnel records were analyzed to develop career profiles for the two populations and to determine the best discriminating variables. The results of the analysis were a set of profiles for the two populations and a list of variables that best discriminated successful from unsuccessful careers. The variables that best predicted success were command experience, number of location changes, intermediate service school, highest award, AFESC tour, and senior service school. The results of this study can aid civil engineering officers and senior officers, concerned with career progression in the civil engineering career field, to develop career profiles that will aid success.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